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THE WILSON BULLETIN

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THE WILSON ORNITHOLOGICAL CLUB

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BAT FALCON
(*Falco albigularis*)

Adult male taken along the Rio Corona near the village of San José de las Flores, 15 miles north of Victoria, Tamaulipas, Mexico, on February 24, 1938. From field sketch in water-color by George Miksch Sutton.

(About one-half life-size)

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THE WILSON BULLETIN
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Vol. 54 MARCH, 1942 No. 1

THE DISTRIBUTION AND MIGRATION OF THE HUDSONIAN CURLEW

BY P. A. TAVERNER

THE records of the Hudsonian Curlew, *Phaeopus hudsonicus*, show a discontinuous distribution with widely separated migration routes and wintering grounds. The following are the breeding localities that have been definitely reported: Norton Sound, Cape Blossom, Kowak River, Camden Bay (Bent, 1929), Mount McKinley (Dixon, 1938), probably Hooper Bay, Alaska (Conover, 1926), Collinson Point and the Mackenzie delta regions (specimens in National Museum of Canada), and the Anderson River (Preble, 1908) in the Canadian Northwest Territories. There are no reports of the species, breeding or otherwise, between Anderson River and the west coast of Hudson Bay, though the intervening country has been surveyed closely enough that so conspicuous a bird could hardly have been overlooked were it present (Clarke, 1940). It breeds commonly at Churchill (Taverner and Sutton, 1934) and on reasonable evidence can be assumed to do so on Southampton Island at the mouth of the Bay (Sutton, 1932, p. 120). Between these two points along the Bay coast A. E. Porsild noted the species in summer on the Tha-Anna River just north of the Manitoba line (Clarke, 1940). From the southwest shore of the Bay at Severn the Royal Ontario Museum has a July 3 specimen with incubation patches which would seem to indicate local breeding. Northward there are sporadic individual records, but without breeding evidence, from the Melville Peninsula (R. W. Bray, MS) and Arctic Bay, north Baffin Island (specimens in the National Museum of Canada).

Nothing is known of the bird on the east side of Hudson Bay, most of which has received close preliminary examination. It is largely a coastal marine species and is rarely seen on fresh water or away from the sea. The only interior breeding record is in the Mount McKinley region, Alaska, reported by Sheldon (1909) and Dixon (1938). Though it seems to have local, isolated, community-breeding associations rather than a widely connected nesting range, there is no evidence that it breeds in the great *terra incognita* of the interior of the Ungava Peninsula.

On the Pacific side, migrants are not generally common on Bering Sea or southern Alaska coasts except at Sitka and near Juneau where

Willett (1914) and Bailey (1927) report them as regular migrants. There are individual records for Haines and Chilkat Inlet in early June (Bishop, 1900); Atlin, British Columbia, in May and June (Swarth, 1936); Circle, Alaska, and the Ogilvie Range, Yukon Territory, in July (Osgood, 1909). It has not been reported south of these localities until we reach Vancouver Island, where it is more or less regular though not numerous (Brooks and Swarth, 1925). Along the Washington (Bowles, 1918) and California coasts, and in the Sacramento and San Joaquin Valleys its numbers increase (Grinnell, 1915 and 1928). This western group winters from Lower California to Chile (Murphy, 1936, pp. 247, 275). These occurrences seem to indicate a main interior movement through the Yukon, across the base of the Alaska Panhandle and an overseas jump to Vancouver Island whence it follows the coast southward. The spring and fall routes are substantially the same. How the Mount McKinley and Hooper Bay birds go and come is uncertain.

The Atlantic migration is more complicated and follows different routes in spring and fall. The Hudsonian Curlew is powerful on the wing and quite capable of making long sustained flight. Its staple food in the north is the low-lying fruit of the subarctic barrens, particularly the crowberry (*Empetrum nigrum*) on which it gorges. Farther south the fiddler crab of the sand beaches seems to be its main food (Wayne, 1910). Its migrations are probably largely governed by the presence of these or similar foods. Where they are absent along travelled routes the birds are likely to pass over or pay only occasional visits in case of necessity. Under these conditions numbers may pass over uncongenial territory and be noted only occasionally.

The principal data on the eastern migration are:

Northern Labrador.—Several flocks at the mouth of the Koksoak River, but do not halt above Davis Inlet (Turner, 1886). "Not common migrant in late summer, but said to appear annually in small flocks, and often in rather large flocks" (Hantzsch, 1928). That author is a little uncertain as to the species observed but it was undoubtedly the Hudsonian rather than the Eskimo Curlew, the only alternative.

Outer Labrador coast.—"An uncommon late summer and autumn transient in Labrador, passing in small flocks" (Austin, 1932). At Henley Harbor, a few, most numerous about September 1 (Coues, 1861).

Head of James Bay.—"Unknown to me as a breeding bird in the Labrador Peninsula. I have a few fall specimens from the south end of James Bay, that is all" (Todd, letter March, 1941). In 1922, W. G. Walton, for twenty-five years missionary on the east side of James Bay, reports "The Curlew, large and small, left our district about 1885."

Gulf of St. Lawrence.—The writer has found it in considerable numbers (flocks up to 300) in late July and in August on the North Shore from the Moisie River to Natashquan and it undoubtedly occurs farther eastward. "Occurs irregularly in large numbers in Anticosti Island"

(Lewis, 1924). "An abundant August and September migrant in the Magdalen Islands" (Bishop, letter, 1910). Well known to shooters on Miscou Island, who, supported by specimens (National Museum of Canada, fall dates), state that it comes in large flocks, feeding on the tidal flats and the berries of the "barrens". In Prince Edward Island, "A not uncommon summer visitor" (McSwain, 1908).

New Brunswick.—E. F. G. White of Ottawa, a competent ornithological sportsman, reports that he has had excellent Hudsonian Curlew shooting in fall at Tabusintac near the mouth of the Miramache River.

Figure 1. Hudsonian Curlew and nest at Churchill, Manitoba, June 22, 1940. Photograph by Ralph S. Palmer.

A fairly common migrant on Grand Manan with July and August dates given (Pettingill, 1939).

Nova Scotia.—"Hundreds occur locally in Cape Breton and Richmond counties and along the southwest shore of mainland during July and August of each year" (R. W. Tufts, MS, 1937).

Newfoundland.—Reeks (1870) mentions it as occurring along with great numbers of Eskimo Curlew though there has been no verification of these records since. Proper dates of recent observation are lacking but it probably still occurs on the unvisited barrens.

New England and southward.—Along the New England and central Atlantic states coasts from many accounts (Forbush, 1925 and others) it appears to be an irregular fall visitor on occasions when forced in by

stress of weather or other circumstances. From Cape May, New Jersey (Stone, 1938, pp. 416-432) southward it occurs more or less regularly in the spring and fall. A few may winter in South Carolina (Sprunt and Chamberlain, 1931), Florida (Howell, 1932), and Louisiana (Oberholser, 1938), but the bulk seem to pass over the West Indian islands with only occasional stops, to the Guianas and the mouth of the Amazon. On northward migration it seems to follow the same route, but disappears from the coast at about Cape May, New Jersey, reappearing regularly on Lakes Erie and Ontario, the only regular inland record for the species en route to northern breeding grounds. Here, with striking regularity about May 24 each year rather large flocks are briefly seen in passage. In evidence of this, W. E. Saunders writes (March 21, 1941): "It is well known that these birds pass up in considerable numbers each year about May 24. At Komoka (near London, Ontario) six or eight years ago there were several flocks totalling 200 or so. Three or four years ago we saw 75 on Lake Erie at Rondeau ... I think that anyone who will go to Rondeau for a week about then would see a goodly number. I get them on my list every year." Of the Toronto region Fleming (1906) says: "Regular migrant, not common, May 27-July 2," that the old birds return early in July and the young from September 1 to 15, but are very rare. Records supplied by the Royal Ontario Museum of Zoology amply support this statement, citing many May occurrences, often in considerable number, and a few small groups and individuals in July and later. J. A. Munro (in Bent, 1929) reports a flight of passing flocks near Toronto totalling over a thousand birds May 24-26, 1910. E. Beaupre (*loc. cit.*) states that Amherst Island at the foot of Lake Ontario is a favorite crossing place for the species in their northward flight and that May 24 is the date upon which they can be looked for, passing in one large flock. The writer has met with small flocks of the species at Point Pelee at the west end of Lake Erie near the end of May and has observed individuals there in July. There are also circumstantial reports that it regularly occurs in large numbers each May 24 on Middle Island in Lake Erie. West of southern Ontario we have no specific records until we reach southern Manitoba and southern Saskatchewan, where occasional single occurrences are reported. There appears to be a slightly stronger flight of the species through western Alberta, where it seems to be gradually increasing in numbers. Frank Farley (letter, August, 1941) reports their occurring regularly now in numbers near Camrose. He states that this undoubtedly marks a recent increase and is not a case of their having been previously overlooked. All of these records are in the spring and all tend to concentrate about the date of May 24. The frequent repetition of this date at widely spread localities in the migration records of this species shows not only a remarkably constant timing, but the speed and concentration with which the spring passage is made. Northward, occasional records point to the continuation of this flight line up the Mac-

kenzie Valley to the Anderson River breeding grounds.

Elsewhere in the interior, as along the Mississippi Valley fly-way, this curlew appears only as an occasional straggler, though earlier reports suggest that it may at one time have been more common there

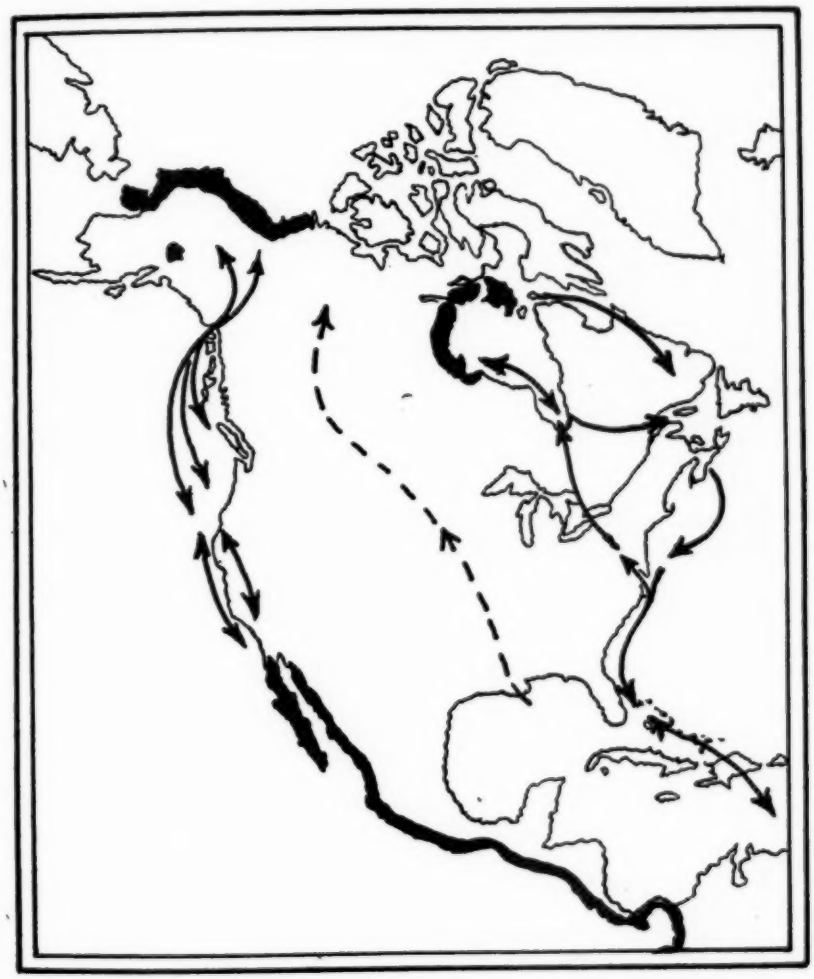

Figure 2. The breeding and wintering grounds and migration routes of the Hudsonian Curlew. The broken line traces the hypothetical former migration route, extirpated in recent times.

(Cooke, 1888). However, it is perhaps significant that Cooke did not repeat this statement in his later report (Cooke, 1910). Many of the older writers confused the three curlews and made numerous misidentifications which may be the cause of the discrepancy between past and

present reports, but there may have been a real change in the status of the species in the region. On the gulf coast of Louisiana the species is a more or less regular migrant with lingerers in winter and summer (Oberholser, 1938). We have seen a considerable series of specimens (Fleming collection), and Griscom and Crosby (1925) report a similar group in the Dwight collection all taken from one lot by different collectors on or near May 24, 1902, at Brownsville, Texas. In the same locality Friedmann (1925) calls it "uncommon" and Griscom and Crosby term it "a rare and little known transient." It therefore seems to be of sporadic and irregular occurrence at this point on the Gulf coast, probably off its regular line of migration.

From these data it seems evident that the Hudson Bay birds on leaving their northern breeding grounds make more or less directly for the berry-laden barrens on the Gulf of St. Lawrence. Some, probably the Southampton or northern contingent, strike eastward and are the birds that Turner and Hantzsch report at the north tip of Labrador. Thence they probably fly south over the berry tundras of Ungava. Others, presumably the group from Churchill and west of Hudson Bay, migrate southward to the end of James Bay and thence overland to the same destination. Uniting and moving to Nova Scotia the two groups strike to sea, not making landfall except under stress of circumstances, to the Cape May region, whence they follow the coast to Florida and make the crossing to South America by sustained flight. The spring return reverses the flight as far as Cape May, where it turns inland and by single flight reaches the shores of Lakes Erie and Ontario as described. Here the stop is but momentary and flight is quickly resumed, hence the infrequency with which it is observed. The last lap may be broken at or beyond James Bay or may be continuous to the ultimate individual nesting stations.

There may possibly have been a third flight group up the Mississippi Valley, through Alberta and the Mackenzie Valley to now unoccupied grounds on the coast east of the Mackenzie River. The individuals of this flight may have been nearly extirpated along with the Eskimo Curlew and may now be, as we hope, slowly recovering (see Farley above). This is purely speculative and has only a degree of probability in support.

Thus, we now have two distinct groups of Hudsonian Curlew that in breeding, migration, or wintering, have no or little opportunity for meeting. This provides an isolation that might be productive of subspecific specialization. With this in mind, the writer has critically examined significant samples of the two groups.

Through the courtesy of Mr. L. L. Snyder of the Royal Ontario Museum of Zoology, 68 specimens were borrowed for personal examination and Dr. Josselyn Van Tyne of the University of Michigan Museum of Zoology was kind enough to measure for me some 54 specimens under his charge. These, with those available in the National Museum of

Canada, provided 143 fully sexed and pertinent birds for examination and comparison. These were divided into eastern and western groups as tabulated below. Geographically intermediate specimens were not used in this comparison.

Eastern	Western
Chesterfield Inlet	North Alaska Coast
Churchill	Mackenzie Delta
Labrador	Vancouver Island
Southern Ontario	California
Gulf of St. Lawrence	Oregon
Nova Scotia	Costa Rica
New Hampshire	Ecuador
New York	Peru
Maryland	Chile
Virginia	
South Carolina	
Florida	
Total—97 specimens	Total—46 specimens

A careful comparison of these two groups, sex for sex, revealed no significant differences in either plumage or in measurement of wings or culmen. In the latter case care was taken to include only spring birds, those known to be at least a year old and whose bills could be assumed approximately to have reached mature growth. That these two physically isolated groups of the species had not appreciably diverged suggests that their separation may have been comparatively recent, perhaps within historical times, possibly the result of the extirpation of a connecting population along with the Eskimo Curlew as suggested previously.

Summary

There are two distinct populations of Hudsonian Curlew, breeding, migrating, and wintering on opposite sides of the American continents. A western group migrates up and down the Pacific coast, apparently passing overland across the base of the great Alaskan peninsula to northwestern breeding grounds. The spring and fall routes are substantially alike. The eastern group follows up the Atlantic coast to the vicinity of New Jersey whence it passes inland, stopping regularly, but momentarily, on the lower Great Lakes and thence to breeding grounds west of Hudson Bay. On the return trip birds make their way either by James Bay or through the interior of Ungava to the Gulf of St. Lawrence and to Nova Scotia and then over sea to the New Jersey region and southward along the coast. Though these two populations seem never to have opportunity of meeting and mixing, no racial distinction is detected between them and their separation seems to have been of comparatively recent date. We suggest that there may originally have been a Mississippi Valley group connecting the two breed-

ing areas in the north but which was recently extirpated—perhaps along with the Eskimo Curlew, with which the species seems to have been closely associated in migration.

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NATIONAL MUSEUM OF CANADA, OTTAWA, ONTARIO

BIRDS AT THE EXTREMITIES OF THEIR RANGES

BY MAURICE BROOKS

FOR the biologist a peculiar interest attaches to plants and animals at the extremities of their geographical ranges. These are the pioneers pushing out to conquer new lands, or the remnants of a retreating army fighting a rear-guard action against adverse factors. The ecologist will always speculate as to the limiting factor in the environment, seeking to find and explain the circumstances which permit existence up to, but not beyond, a certain line. The twin dramas of dispersal and occupancy seem very real in such critical situations.

I happen to work in a region where a considerable number of birds are approaching or actually reaching their northern, or their southern, limits. A few species are at their longitudinal limits within the area, but these are not so conspicuous as are those which are at their latitudinal boundaries. Within West Virginia such northern birds as Wilson's Snipe, Saw-whet Owl, Hermit Thrush, Olive-backed Thrush, Nashville Warbler, Northern Water-thrush, Mourning Warbler, Bobolink, Purple Finch, Savannah Sparrow, and Swamp Sparrow reach their known southern limits, while Alder Flycatcher, Olive-sided Flycatcher, Tree Swallow, Red-breasted Nuthatch, Brown Creeper, Winter Wren, Short-billed Marsh Wren, Golden-crowned Kinglet, Henslow's Sparrow, and a number of warblers are approaching such limits. The Black Vulture and Swainson's Warbler are not known to breed farther north, while Bewick's Wren, Carolina Wren, Acadian Flycatcher, Carolina Chickadee, Mockingbird, Blue-gray Gnatcatcher, White-eyed Vireo, Sycamore Warbler, Kentucky Warbler, Summer Tanager, and Bachman's Sparrow are nearing their northern limits. West Virginia, therefore, offers excellent opportunities for observation on the pioneers or the retreating remnants among many bird populations.

After some study of the pertinent ornithological literature I have been impressed by two things; first, that descriptions of bird behavior made at points away from centers of abundance and near the range limits of the species, are often misleading as regards the species as a whole; second, that observations made at these range extremities may, as time goes on, have a peculiar value in tracing the origin and evolution of new races.

Ornithology owes a tremendous debt of gratitude to the scholarship and the literary talents of scientists and bird students in northeastern North America. New England biologists have been fired with enthusiasm and blessed with the gift of words, beyond the rest of us; consequently they have portrayed the bird life around them in such a manner as to make other sections (the near-South, for example) seem ornithologically illiterate. The compiler of a manual turns naturally to those descriptions of a species which seem best to combine scholarship and literary excellence; consequently, and somewhat unfortunately,

many standard works use descriptions of certain species which relate to individuals away from the centers of their abundance. Hence they often misrepresent, or fail to present adequately, the species as a whole.

As a classic example of such descriptions one might take the bulk of the literature relating to the Yellow-breasted Chat (*Icteria virens*). I used to read of (and marvel at) this shy and unapproachable bird, difficult to see, almost impossible to photograph at the nest, the very essence of the elusive. Well, this just wasn't the Chat that I knew down on a bushy West Virginia farm at all. My birds lived in thickets it's true, but when I was picking blackberries the males would often sing in the locust trees above my head, easily observed and not at all shy. The pair that nested just below our house visited our yard regularly, and the male had a favorite singing perch in an apple tree in plain sight from the kitchen window. We found nests rather frequently, and I recall that my father photographed a Chat at its nest before he ever discovered the difficulty of the task. Here, obviously, was a matter which needed explanation.

In recent years I have had opportunities to observe Chats in more northern regions, southern Michigan and central Pennsylvania. To my surprise I have found them in these localities exactly as they are depicted in classic literature, wild and elusive. The explanation is of course that northern observers have judged Chats by the few birds which reach these range extremities, whereas West Virginia, lying much nearer the center of abundance for the species, has a population behaving in more typical fashion. George A. Petrides (*Wilson Bulletin,* 50, 1938:184–189), writing of Chats in and near the District of Columbia, has pointed out the relative tameness of birds which he has observed and photographed, and I do not find the emphasis on shyness in the writings of other southern observers. New England, New York, and Michigan birds, outposts of the species, have apparently overshot the mark, and seem nervous and unapproachable, but these individuals do not typify the species.

Let us imagine a description of the Robin written by one who had seen it only in the Shickshock mountains of the Gaspé. It might read somewhat as follows:

"A resident of the densest fir and spruce forests, where it breeds with Bicknell's and Olive-backed Thrushes. It is excessively nervous and difficult to approach, and can be observed only by the most careful stalking, and the greatest patience on the part of the bird student."

Such a description might be absolutely true-to-life for the region, yet it would scarcely apply to the birds of our dooryards and orchards.

It is respectfully suggested to future authors and compilers of manuals that they make an effort to secure descriptions of the behavior of birds at or near the centers of abundance for the species, even though the words in which these descriptions are couched lack something of literary grace, and even though the authors of the words may be rela-

tively obscure local observers. Science, rather than literature, will be served by such efforts, but the results will certainly come closer to picturing the birds as they are.

It will be unfortunate if, in making the observations and drawing the conclusions above, I leave the impression of having regarded these behavior descriptions made at extremes of range as of little value. Quite the contrary is true.

Without attempting to delve into the tremendously interesting, and tremendously involved, question of the origin of races within a species, or even of speciation itself, it may properly be pointed out, even though it be trite to do so, that isolation of a given segment of the population from the main body seems to be of prime importance in racial separation. When birds (as other organisms) are found at the limits of their ranges the populations often occur in enclaves, disjunct from the remainder of the species' range. A mountain system may form the barrier between populations, bodies of water may intervene, or there may be a broad expanse of land which lacks suitable vegetative cover for a given species. In any event, we have in such situations conditions which seem ideal for the initiation of race separation.

Our ideas of the time required for racial separation are about as hazy as are our concepts of the criteria by which populations may justifiably be separated into races and species.[1] We certainly have little evidence of mutations within recent times which have, in nature, resulted in new bird races or species, nor have we been observing long enough to see clearly the workings of selection.

Realizing the difficulties of measurement and description involved in such situations, it seems perfectly logical to suppose that morphological or physiological differences may not always be the first to appear when racial separation is in process. A new behavior pattern may just as well initiate the modification. This is exactly where the importance of careful field observations made at the range extremes of species comes into the picture. In these variations of behavior may lie the clues to some of the racial separations which are occurring, or which may occur, in these disjunct populations.

The Wilson Ornithological Club has taken a proper pride in its objective—the study of the living bird in the field. What group of observers, then, may more fittingly search out and record for future students of the evolutionary process such detailed, and often seemingly unimportant, bits of information relating to variations in behavior patterns as are to be gathered where birds are reaching their geographical limits?

A few specific observations will give point to these remarks. Let us first consider Bewick's Wren (*Thryomanes bewicki*). This bird is

[1] One rare exception is R. E. Moreau's interesting estimate of the age of certain Egyptian subspecies (*Ibis*, 1930: 229–239).

approaching the northern limits of its range in West Virginia. As many writers have pointed out, it seemingly has had great difficulty in competing with the more aggressive House Wren. Whether or not this competition be the sole cause, Bewick's Wren is today largely absent from the broader river valleys, territory which it once occupied abundantly; local in much of the hill country; and really common only in mountainous sections, where it reaches the fringes of the red spruce forests at 4,000 feet elevation.

Bewick's Wren has shown itself to be a highly plastic species and has thrown off a number of races throughout its range. Although the birds which now nest at the borders of the spruce forest have not been shown to be racially distinct, may it not be that we have here the ideal pattern for a true racial separation? Certainly the environment of the southern highlands is quite different from any occupied elsewhere within the range of the species.

Another bird to watch is Swainson's Warbler (*Limnothlypis swainsoni*). Within recent years observers have learned that this bird, so long associated exclusively with the cane brakes of the south, also occupies a considerable area of the southern highlands in Tennessee, North Carolina, Virginia, and West Virginia. It nests at altitudes up to 3,000 feet or more, and chooses sites that are tangles of rhododendron, mountain laurel, hemlock, and American holly. So far as is known, there are no connecting populations between the coastal or river swamps and the mountains. A more perfect set of conditions for racial separation could scarcely be asked for. We have regarded Swainson's Warbler as a stable species which has not undergone any racial differentiation. However, we have no idea how long this mountain population has occupied its present range. If this be a comparatively recent extension, then we may be witnessing a case where behavior change precedes morphological modification.

In the case of Bachman's Sparrow (*Aimophila aestivalis bachmani*) we have an even more interesting situation. Dr. H. C. Oberholser has examined a number of West Virginia and Pennsylvania birds of this species, and he pronounces them indistinguishable from Carolina specimens. Yet, as I have pointed out in another paper (*Wilson Bulletin* 50, 1938:86–109), the northern birds very seldom build domed or arched nests, but such nests are almost invariable with southern birds. Here is a considerable behavior difference without any observable morphological change to accompany it. It would certainly be rash to say, though, that such a modification will not appear in time.

These are but a few instances. Mr. A. F. Ganier, in a paper before the Wilson Club in 1940, called attention to the morphological intergradation between Yellow-throated and Sycamore Warblers, despite the fact that behavior of the two races, at least in the selection of nesting sites, is quite different. In the southern portion of its range the Black-throated Green Warbler is by no means restricted to coniferous

forests, since it nests in many beech-maple, or oak-hickory, associations, with no conifers nearby. Such instances might be multiplied indefinitely.

Every paleontologist and every comparative anatomist mourns the relative scarcity of bird fossil remains. Yet no one imagines that evolution is finished, or that it is a static process. With every considerable range extension there arises the possibility that birds will be thrown into an environment so new that changes in behavior and changes in morphology may eventuate. We have seen, and marked, many such range extensions. The notes on bird behavior which we take today may guide the thinking of the student of evolution a good many years hence.

Division of Forestry, West Virginia University, Morgantown, West Virginia

Aves, Zoological Record, 77, for 1940 (published in 1941), 60 pp. By W. L. Sclater. 6 s + 4 d postage. Zoological Society of London, Regent's Park, London, N.W. 8.

For the seventy-seventh consecutive year the Zoological Society of London has published its classified index to the ornithological books and papers of the world. As during the first World War, the present volume reflects in its reduced size the unsettled state of our civilization. Only 830 titles are listed, compared with 1,446 for 1939. It should be noted that the former method of cross-indexing has been slightly changed and thereby definitely improved.

The volume was prepared by W. L. Sclater who has carried this burden since R. Bowdler Sharpe passed the duty on to him after preparing the 1908 index. Thus it is Sclater's thirty-second volume!

Ornithologists everywhere should support this important service and improve their knowledge of the subject by buying annual copies of the valuable Aves section.—J. Van Tyne.

SOME ASPECTS OF SPRING WARBLER MIGRATION

BY CYRIL E. ABBOTT

MANY records of migration based upon observation alone are without object. After I had made records of that kind for sixteen years, it occurred to me that much real information might be obtained by using special methods of observation on a single group of birds. This paper is a discussion of the results of applying such a method to warblers.

Unfortunately, frequent migrations of my own made it very difficult to keep accurate and complete records, and the material in this paper represents that extracted from a great deal of chaff. Consequently the results are suggestive rather than final. However, identifications were made as thoroughly and carefully as field conditions would permit, and the notes made at Chicago were checked against the banding records of Mr. Karl Bartel, who was operating a station in the Oak Hill Cemetery where my own observations were made. The remaining data were

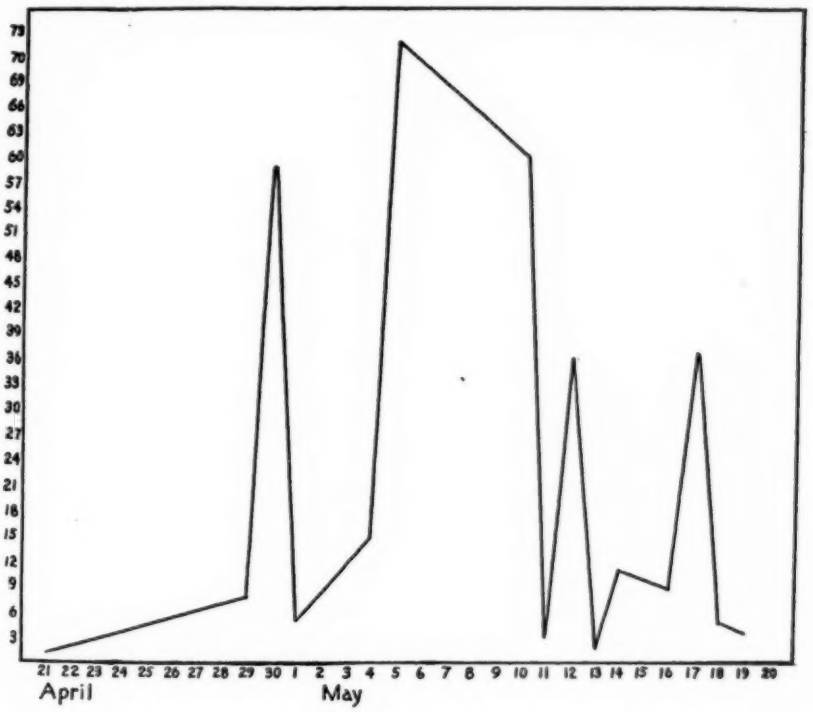

Figure 1. Spring migration of all species of warblers at Chicago in 1934. The column on the left represents numbers of individuals seen.

collected at Searcy during the spring seasons of 1939 and 1940. Searcy is a poor place for such observations because the bulk of the birds apparently passes east of that region. Data collected at Chicago in 1933 and 1935, though corroborative of other material collected, were too fragmentary to record here.

The method employed was extremely simple. Beginning early in the season, and equipped with a pair of binocular field glasses and a pack of 3″ x 5″ cards, observations were begun about 6:00 A.M., and continued for about an hour and a half over an area of approximately half a square mile. In Searcy this included the campus of Harding College and adjacent territory. Each card bore the name of a species of warbler known to occur in the region; whenever a bird was seen, a check mark was made on the appropriate card. Since warblers do a great deal of moving about within small areas, it is easy to recount individuals.

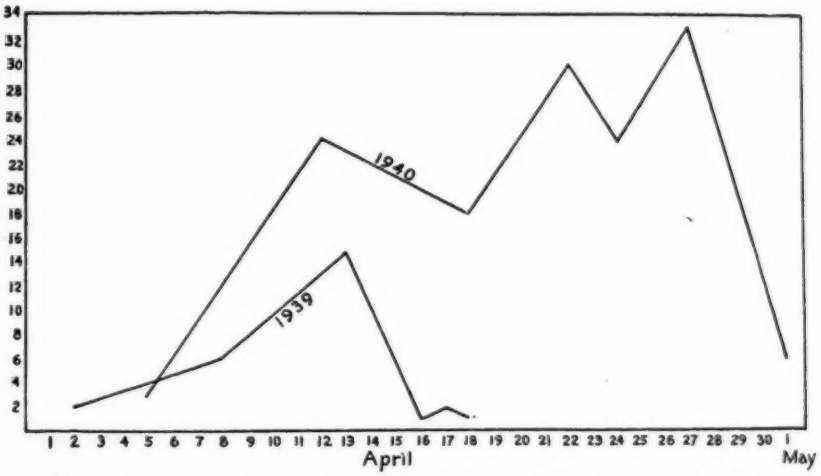

Figure 2. Spring migration of all species of warblers at Searcy, Arkansas, in 1939 and 1940. The column on the left represents numbers of individuals seen.

For this reason count was taken very rapidly in one or two trees and another count made some distance away. It was also necessary to avoid following a group of moving birds to avoid counting them over again. Even with such precautions a wide margin of error was inevitable. But, on the other hand, what was wanted was a series of comparisons rather than exact figures.

That the method was reliable for the purposes intended is indicated by the fact that the results tallied both with more casual observations and with banding records. The purposes were several: to form a general estimate of the numbers of warblers migrating at different periods of the season; to test the wave theory of migration; to compare the

relative numbers of various species; and to determine the migratory peculiarities of different species of warblers.

Graphic representation makes the results evident. For instance, examination of Figure 1 indicates that migration does occur in waves, and that it has a seasonal optimum so far as numbers are concerned. But it indicates further that the peak of migration is skewed toward the latter part of the season. It is evident from Figure 2 that this peculiarity is not accidental, since the data in the latter figure were taken at a different place and different times from those given in Figure 1. This means that there is a tendency for warblers to "pile up." That is to say, they arrive at a given point faster and in greater numbers than they leave it.

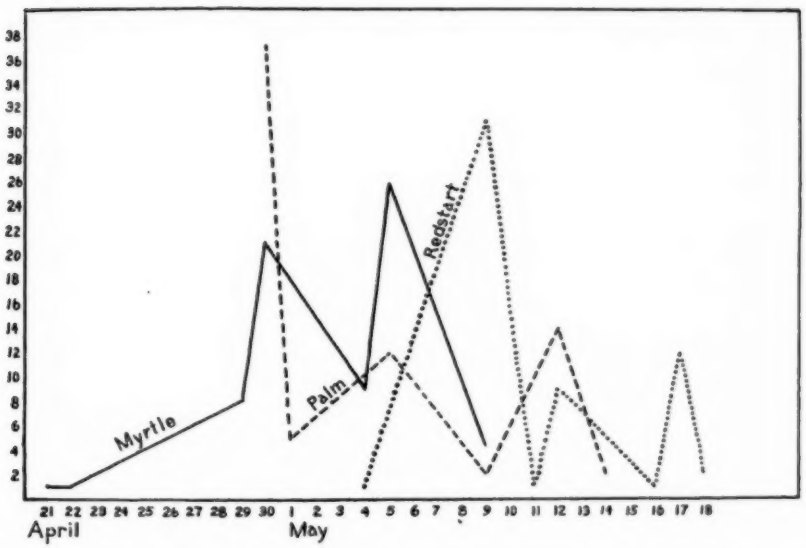

Figure 3. Spring migration of the three most common species of warblers at Chicago in 1934. The column on the left represents the numbers of individuals seen.

The graphs in Figure 3 indicate that, although the migrations of the Myrtle Warbler (*Dendroica coronata*) and Redstart (*Setophaga ruticilla*) overlap, the latter species arrives later and leaves later than the Myrtle Warbler. Yet, curiously enough, the peaks of migration for the two species are close together. My casual observations of other years substantiate this conclusion.

For years before making these observations it was my impression that the Palm Warbler (*Dendroica palmarum*), instead of appearing in increasing numbers, followed by a gradual decline, appears *all at once,*

and then declines in numbers rather rapidly. This is certainly what occurred in Chicago in 1934, as the graph clearly indicates. Very few, if any, members of that species appeared there before April 30.

A frequency histogram of species plotted against numbers of individuals for the year 1934 seems to indicate that as the *total number of individuals declines the variety of species increases.* That is to say, the peak of the migration consists of great numbers of a few species, and as the number of warblers becomes smaller the variety of species increases. Thus, of the 302 warblers observed, 204 (about 67 per cent) belonged to one of three species (Myrtle, Palm Warbler, or Redstart), and these all appeared early in the migration. The remaining 18 species were scattered through the season, but with a greater number of species toward the end of the season.

In conclusion, I believe that these observations indicate that:

1. The warbler migration as a whole occurs in waves, with a distinct peak or seasonal optimum.

2. There is a seasonal optimum for each species.

3. The seasonal optimum for warblers as a group is skewed, indicating a tendency for the birds to accumulate.

4. Some species, such as the Palm Warbler, exhibit individual peculiarities of migration.

5. The greatest variety of species occurs near the end of the migration.

HARDING COLLEGE, SEARCY, ARKANSAS

COMMENTS ON BIRDS AND CODLING MOTH CONTROL IN THE OZARKS

BY JOHNSON A. NEFF

FOR nearly fifty years my parents have engaged in the growing of fruit, largely apples, in the southwest Missouri Ozarks. Thirty years of my life have been spent there in the orchards of the family ranch, with time out for the realization of a graduate degree in horticulture and entomology. Initiated into the pleasures of bird study at a very early age, few opportunities were ever passed by; we were never too busy to stop work to watch the birds that were so abundant in the orchards. And the last ten years, spent in the employ of the U.S. Fish and Wildlife Service, have permitted a wider scope of observation, extending through many States.

The codling moth (*Cydia pomonella*) has long been known as a leading pest of the apple, causing severe losses. In that portion of the Ozarks where I grew up this insect, although long present, was of minor importance until about 1915. During the decade 1915 to 1925 the codling moth became increasingly abundant, and despite the use of every modern method of control, since 1925 has been a devastating pest of most of the Mid-West apple-growing districts.

The eggs of the codling moth are laid on twigs, leaves, or small fruits in the spring. Upon hatching the tiny worms enter the fruits and reach maturity there. Then they leave the fruits, and crawling down the branches they search for secluded niches in the crotches, under bark scales, in the rubbish on the ground, and even under the surface of the soil in any location offering darkened seclusion. Here they spin cocoons, pupate, and finally emerge as adults. Depending upon season and climate, two to four broods per summer may develop; the last remains in the larval stage, hibernating in the cocoon over winter, pupating in the early spring, and emerging as adults about the time the young fruits begin to form.

Among the cultural methods commonly utilized in combating this pest, is the banding of the main trunk and major scaffold branches. With specially designed scrapers the trees are denuded of loose bark. Bands of burlap, red building paper, special chemically treated paper, or even in some instances several thicknesses of newspaper, are placed about the trunk and branches, thus affording a location where mature worms may find protection for hibernation.

The bands are inspected regularly throughout the summer and the larvae or pupae found hibernating under them are killed and the bands replaced upon the trees. In some regions, in addition to bands, it has been found that tightly wadded pieces of newspaper jammed into the major crotches are helpful. These are burned and new wads inserted at each inspection.

Beyond question the leading avian enemies of the codling moth are woodpeckers, chiefly the resident races of the Downy and Hairy Woodpeckers (*Dryobates pubescens* and *D. villosus*). In the Ozarks two decades ago these birds were not abundant in the orchards during summer, but in autumn they moved in from woodland and spent much of the winter hunting codling moth larvae in the orchards. Every scale of bark, every niche and crotch, was inspected time and time again, and the larvae hibernating even under the paper and burlap bands were neatly removed without undue injury to the bands. On several occasions I carefully inspected trees late in the winter which had been severely infested early in the autumn, finding where as many as 300 to 400 larvae had been removed, and frequently failing to find a single remaining worm. Recent visits to the old home ranch indicate that there has been a decided decrease in the number of these birds, probably because of the slow but constant destruction of the small farm woodlots that once furnished ample nesting sites.

During the 'teens and early twenties I maintained in the orchard trees a group of bird boxes, ranging from thirty to more than a hundred. A majority were occupied each year by Bluebirds, and to some extent by titmice and chickadees, and because of the nest-boxes the population of these species was greatly increased about the orchards. When in 1925 the codling moth suddenly reached a serious stage of abundance we found that these nesting boxes and the nesting material therein were favored hibernating spots. During the winter each box could be dismantled, the worms killed, and the old nest destroyed, but this was not possible during the summer nesting season. Consequently the bird-boxes had to go, and with them went the Bluebirds and most of the titmice and chickadees.

This discovery led to examination of other open bird nests found in the apple trees including those of Robins, Brown Thrashers, orioles, and others. The dense construction of the Robin's nest made it a good home for the adaptable apple worm, and on one occasion more than 100 hibernating larvae were taken from a single nest. Now each empty nest is carefully removed from the trees and burned as soon as possible after the birds have left it.

About 1927 we began to find our building-paper bands torn into shreds and often totally freed from the tree, the pieces blown about by the winter winds. This was a new experience, and one that remained unsolved for more than a year. During the next winter season I chanced to pass through an orchard on the morning after a light snowfall. At last the mystery was solved, for Crow tracks led from tree to tree and newly-torn paper bands and parts thereof lay on top of the new snow. Later Crows (*Corvus brachyrhynchos*) were seen actually tearing at the bands. This activity has continued through each winter season since that time. Even the tightly wadded pieces of newspaper are removed from the

crotches of the trees. From the apple culture standpoint this activity of the Crow is not beneficial. It begins in September before the late varieties of apples have been harvested, thus removing the papers before the last of the worms have descended the trunks. At that time the orchardist is very busy and cannot replace the bands until the fruit is picked. By that time the bands or pieces of them are scattered widely over the orchards. Fragments may carry with them some of the worms, for the Crow seems more interested in tearing paper than in searching each piece carefully for the worms it contains. The Crows do eat some of the worms that are exposed to view, but leave others within the paper scraps. Worms so exposed are undoubtedly killed by winter cold or eaten by other birds, but those imbedded in the paper scraps may well survive.

It should be emphasized that the observations here recorded were not in deserted orchards, but in producing ones where modern cultural methods are used as soon as developed. Spraying and other protective practices follow the schedule laid out by a resident state entomologist. Yet under certain favorable climatic conditions, after the best of care, some years as much as 40 per cent to 50 per cent of the apple crop is wormy or defaced by worm "stings" at picking time. With regret we watched the gradual decrease of the Downy and Hairy Woodpeckers in the community as the small farm wood-lots were cut away, for these birds were real benefactors. The cutting of the woodlots has been slow but continued, and no effort has been made to plan for replenishing of the wood supply by farm reforestation. Such a program might one day result in these birds regaining their former numbers.

The use of nest-boxes in the orchard was of course an artificial, man-made attraction, a practice highly recommended by many conservationists. Under the circumstances, however, we were forced to remove them from the orchard for the potential use of the boxes by the codling moth outweighed the benefits received. Bluebirds, although insect feeders, do not appear to feed more than casually on codling moth adults and larvae. Some boxes are still maintained on poles or in trees in pastures at a distance from the fruit trees.

Few fruit growers, even the most radical, would suggest that occupied bird nests in the open fruit trees should be destroyed, although some have learned, as we did, of the hazard of a Robin's nest as a hibernating spot for codling moth larvae. This knowledge dulls somewhat the pleasure that we once obtained from the dense bird population of our orchards. Certainly we must remove and burn every nest as soon as the young desert it.

The band-destroying activity of the Crow adds little to the sum of its already highly publicized economic status, and may well be classed as merely a nuisance activity. Even though the Crows do eat some of the exposed larvae, the effectiveness of our cultural operations would be enhanced if the Crows had not learned to tear away the bands. No matter how much he may like birds, the first endeavor of the farmer is the

earning of a livelihood, and the self-interest of the task demands that to a great extent he consider his own problems before those of others far away. The observations recorded may well raise doubts locally as to the benefits accruing from the presence of certain birds, for many of the species commonly nesting in the orchards of the Ozarks are not highly rated as codling moth destroyers. The observations described illustrate the local contradictions encountered in practical bird economics which may leave even an ardent bird student somewhat at a loss in evaluating the status of his local bird friends.

WILDLIFE RESEARCH LABORATORY, DENVER, COLORADO

BIRDS IN YOUR BACK YARD. By Virginia S. Eifert. Illinois State Museum, Springfield. Popular Science Series No. 2, 1941. 240 pp.; 96 full page plates. $.60 postpaid. (Stamps not accepted).

Too frequently we speak of certain bird publications as *local*, very much as though the term were, in itself, a derogation. Mrs. Eifert, in her recent volume, is concerned primarily with the birds of Sangamon County, Illinois; in that sense her notes are of local interest, but since the species that she pictures and discusses are not, most of them, local in their distribution her work will have value, and create interest, in an area very much more extensive than a single county or state.

In our familiarity with, and dependence upon, colored plates reproduced from paintings, or kodachrome pictures and slides, we are prone to forget how effective black-and-white may be as a medium for presenting bird portraits or studies. Against a gray background Mrs. Eifert has made excellent use of black-and-white to picture more than one hundred and twenty bird species. Her study of the Redwing (page 177) is particularly effective, and she has made excellent selection and use of plant materials in some of her portraits. Many of her warblers are highly lifelike, and the White-throated and White-crowned Sparrows (page 205), are noteworthy.

Chapters on attracting and feeding birds are included; there is a check-list of the birds of Sangamon County; notes on local bird distribution, and a bird calendar, week-by-week, adds to the value of the publication. Teachers throughout the Central States will find it particularly helpful.

Occasional small lapses, such as departures from the A. O. U. Check-list order (see the warblers in the Sangamon County list) may be noted, but the work as a whole is accurately and artistically done. One wishes that other state museums might be able to place such a volume in the hands of its teachers, school children, and bird students.—Maurice Brooks.

NIGHT DESERTION BY NESTING COMMON TERNS

BY NELSON MARSHALL [1]

IN recent years there has been widespread nesting failure among the colonies of the Common Tern (*Sterna hirundo hirundo*) in the island region of western Lake Erie. Though the basic causes remain unknown, a very striking behavior associated with this failure has come to my attention. This is the mass night desertion of the nests by the adults as observed on Starve Island during the past three seasons.

The existence of nesting colonies on Starve and neighboring islands for many years indicates that nesting has probably been successful in the past. The extent of this success is unknown but the descriptions of Lynds Jones (1912) and E. S. Thomas (1927) indicate large colonies with many nests and chicks. A resumé (Table 1) of colony conditions, as observed by C. F. Walker and myself, is presented beyond.

During the course of this study I have received valuable aid from many associates at the F. T. Stone Laboratory. I am very grateful to all of them, especially to Dr. Charles F. Walker for his guidance and to my wife, Grace Terry Marshall, for help in preparing this paper.

The night desertion of the nests as observed on Starve Island is a group behavior phenomenon with characteristics which may be portrayed by an account of my first overnight stay there (July 3–4, 1939).

I entered my canvas blind at 7:30 P.M. The sun started to set at 8:00 P.M. (Eastern Standard Time). Nothing abnormal in nesting behavior was observed until 8:31 when a great majority of incubating terns took flight. They formed large groups, flying back and forth low over the island. As these groups of low-flying birds crossed over the water, they sometimes swooped to within a few inches of the lake level. As they flew back over the island many individual birds hovered over their nests and sometimes returned to them, though sometimes they flew on. This phenomenon lasted for about half an hour. All behavior indicated that the terns were being stimulated on the one hand to depart and on the other to incubate. Birds which had resettled to their nests often took to the air again to join flying groups passing low overhead. Such return and departure of individuals was commonly repeated several times. More and more nests were permanently deserted and the groups of low-flying birds diminished in size as terns made their departure from the vicinity of the island. The result was an almost complete absence, by 9:05 P.M., of adults either on or near the island.

I noted that no phase of this behavior resembled the flights of general alarm that are so frequent in Common Tern colonies. In these "up-flights," to use an expression employed by F. B. Kirkman (1937) in connection with the alarm flights of the Black-headed Gull, the terns fly higher and low-flying groups are lacking.

[1] Contribution from the Franz Theodore Stone Laboratory of Ohio State University, Put-In-Bay, Ohio.

TABLE 1

COMMON TERN COLONIES VISITED IN WESTERN LAKE ERIE *

Starve Island, Ohio	
1938: July 8 and Aug. 3	518 nests (July 8); 11+ young seen (Aug. 3) all able to fly, not necessarily raised here
1939: Repeated observations May 25–Aug. 28	1052 nests (May 25); 182 nests (July 21). Very few eggs hatched; only one chick known to survive
1940: Repeated observations May 21–June 26	295 nests (May 21); 513 nests (May 28); 257 nests, 12 chicks (June 26)
1941: Repeated observations June 15–Aug. 9	90 nests, 2 chicks (June 15); 109 nests, one chick (June 20); 64 nests, 2 chicks (July 10); no nests or young (Aug. 9)
Big Chicken Island, Ontario	
1938: July 24	179 nests, about 350 young (reported by Dale W. Jenkins)
1939: July 8 and 29	485 nests (July 8). No young seen this season; Herring Gulls nested successfully
1940: July 15	No evidence of nesting terns; Herring Gulls nested successfully
1941: July 9	No evidence of nesting terns; Herring Gulls nested successfully (remains of 64 nests still in evidence)
Big Chick Reef and Little Chicken Island, Ontario	
1939: July 8 and 29	102 nests, 2 chicks on the Reef, 163 nests on the Island (July 8). A few Double-crested Cormorants had nested successfully on the Island
1940: July 15	No evidence of nesting terns. 4 Cormorant nests on the island
1941: July 9	No evidence of nesting terns. Herring Gulls had nested successfully (remains of 8 nests on the Reef and 16 nests on the Island still in evidence)
Middle Island, Ontario	
1939: July 13	267 nests
1940: June 27	3 nests, plus evidence of additional nests that had failed
1941: July 12	No evidence of nesting terns
Fish Point, Pelee Island, Ontario	
1938: July 20	26 nests
1941: July 21	121 nests, at least 100 young in various stages of development
The Rattles (2 small islands off Rattlesnake Island), Ohio	
1939: Repeated observations July 21–Aug. 3	Nests common but young very rare
1941: Repeated observations July 5–Aug. 8	45 nests (July 5); 45 nests (July 15); 17 nests, 2 chicks (Aug. 8)

* Unless otherwise stated, no chicks were seen when the nest counts were made.

TABLE 1 (continued)

North Harbor (Island), Ontario	
1939: July 12	26 nests
1941: July 9	18 nests
Middle Sister (Island), Ontario	
1941: July 1	56 nests
Detached Rocks Bordering Green Island, Ohio	
1938: July 13	33 nests
1940: Repeated observations throughout breeding season	18 nests (July 8). No young seen on late July and early August visits
1941: Repeated observations throughout breeding season	14 nests (June 27); 14 nests (July 15); no nests or young (July 31)
Lost Ballast Island, Ohio	
1938: July 31	Evidence that a small colony (10–30 nesting pairs) had failed
1940: June 22	One nest, 2 chicks
1941: July 5	No evidence of nesting terns

From 9:12 to 9:35 I flushed four adult terns, the only birds found remaining on the island. During the night isolated calls were heard from individual birds but none returned. It was a bright moonlight night with moderate winds. The minimum temperature recorded at the Stone Laboratory, a straight line distance of 2⅛ miles from Starve Island, was 70° F.

The first vague signs of dawn came at 3:50 A.M. At 3:55 large, noisy groups of terns commenced to fly low over the water near the island. Soon they flew back and forth over their nests. Many hovered above their nests and eventually alighted. These alighting birds, however, usually returned to the flying groups again, often repeating this several times before settling to normal incubation. The return of the birds in many ways resembled their departure behavior executed in reverse order. At 4:40 this return behavior seemed complete and normal incubation was in progress. Sunrise probably occurred about 5:00 A.M. but the exact time was obscured by clouds.

In the 1939 breeding season I also observed night behavior on Starve Island July 11–12 and 21–22 and the same desertion was found to occur. The departure on July 21 was witnessed from a boat floating 100 yards to the lee of the island, and thus a check was made against the possibility that desertion behavior had been due to my presence. Desertion by the terns nesting on the Rattles, two small islands adjacent to one another, was also ascertained by the absence of adults when we arrived there at 9:15 P.M. on July 21.

During this same season we made attempts to trace the night movements of the Starve Island terns but, although we found that they

vacated the immediate vicinity of the island and we even followed some groups by boat approximately 8 miles from the breeding colony, we learned nothing conclusive about where and how they spend the night.

In 1940, observations were begun earlier in the season. Attempts to study night behavior at Starve Island on May 25–26 and 28–29 yielded confusing results. The terns did not depart at twilight in either instance. On May 25 the terns were flushed by my activities at 9:10 P.M. and did not return (probably until dawn, but I did not stay to prove this). On May 28–29 the colony was not deserted till sometime after 1:00 A.M. and the terns did not return till early dawn at 3:50 A.M. I made another observation by arriving at Starve at 3:00 A.M. on June 1. At that time the terns were present and incubating normally. My arrival caused immediate desertion but the terns returned at the earliest signs of dawn. Later in the season, on June 12–13, 14–15, and 21–22, I noted unquestionable instances of night desertion at Starve Island. The behavior observed on June 12 and June 21 showed that birds do not always follow the set pattern of departure described for July 3, 1939, but may simply desert their nests one by one during the early hours of darkness. On the other hand, I have never found any variation in the early morning arrival behavior. Desertion occurring on June 14–15 was demonstrated by arriving at the island at 3:00 A.M. and finding the colony vacated, a fact which further supports my conviction that desertion is not the result of human intervention.

Visiting the colony in the early morning has proven to be the most practical method of observation. It involved arriving about a half hour before the earliest signs of dawn (about 3:15 A.M.). In the colonies studied, the unconcealed investigator arriving at that hour always caused desertion by whatever terns remained. However, such desertion was not effective for much more than a half hour because deserting terns consistently returned at dawn. Though such a procedure does not enable one to study the nature of the departure behavior, I confined my observations to this method in 1941. Early morning trips to Starve Island on June 20 and July 9 and to the Rattles and Green Island colonies on July 15 showed that, with a few exceptions, the nests had been deserted on these nights.

Even when the great majority of adults desert, a few often remain and continue to incubate. On June 15, 1940, I recorded the temperature of one of these attended nests a few minutes after the adult had been flushed. It was slightly above 80° F., while the temperature of the air and of four deserted nests was 65° F. Night desertion may have exposed the eggs to temperature much lower than this. However, for the dates on which desertion was ascertained, 62° F. (for June 21–22, 1940) is the lowest temperature recorded. Using data presented by R. A. Huggins (1941), one can compare the above temperatures with those normally maintained by the incubating Common Tern, as studied during the daytime. He records an average egg temperature of 96.3° F.

for four nests, while the average air temperature during the four trials involved, each of which lasted six hours, was 82.4° F. The lowest egg temperature recorded by Huggins for the Common Tern is 85.5° F.

It has never been my privilege to observe a successful Common Tern colony during the dark hours and I have found no published accounts of normal night behavior. E. S. Thomas (1927) describes an instance of night desertion about July 22 while his party was actively banding terns at Starve Island. There were some nests present but at this late date most of the young were in the "flapper" stage. Social flights at twilight as displayed by the Common Tern (*Sterna h. hirundo*), the Little Tern (*Sterna a. albifrons*), and the Sandwich Tern (*Sterna s. sandvicensis*) are described by Friedrich Goethe (1939), and M.B. Trautman (1939) adds the Black Tern (*Chlidonias nigra surinamensis*) as another exhibiting an evening behavior pattern of this general nature during the breeding season. Both H. L. Ward (1906) and R. M. Strong (1914) give accounts of comparative inattentiveness of Herring Gulls (*Larus argentatus*) toward their young during the dark hours of the night but these adults did not forsake the general neighborhood.

For information on the night behavior of the Common Tern in successful colonies, I am grateful to Dr. Charles E. Doe, Department of Ornithology, University of Florida, and to Mr. Charles B. Floyd, Secretary of the Northeastern Bird-Banding Association, both of whom have had extensive experience in Cape Cod tern colonies during the hours in question. They have found the Common Tern to be a tenacious incubator during the night, even when the birds were frightened repeatedly by the activities of men in the vicinity.

It is difficult to conceive of predation as a cause for this desertion and nesting failure because of the nature of the behavior involved and because no likely predators are known. The water snake (*Natrix sipedon insularum*) has been common in prosperous tern years as well and there is no evidence that it feeds on eggs or young. I have not seen any mammals, not even rats, on Starve Island. I have observed the Black-crowned Night Heron (*Nycticorax nycticorax*), a species becoming increasingly abundant in western Lake Erie, eating the eggs from unattended nests during the night but I have also seen this bird quickly retreating from the attacks of the defending terns when the colony is well attended. Though Herring Gulls have been nesting in increasing numbers on the Chicken Islands in the past few years, they have not nested on Starve Island and observations yield no evidence that they disturb the terns there.

During the past two years I have kept records of the fish carried to the island in the bills of Common Terns. Such food was composed almost entirely of cyprinids. The most abundant of these, the Lake Shiner (*Notropis atherinoides*), was also found by C. G. Manuel (1931)

to be the most abundant fish in the diet of these terns when he studied their food habits on Saginaw Bay, Lake Huron. It seems probable that an insufficient or a comparatively inaccessible food supply would disrupt nesting activities, as was suggested by O. S. Pettingill (1939) with regard to failures observed in a colony of Arctic Terns (*Sterna paradisaea*). However, it is not possible, at present, to judge whether or not the dietary requirements for normal incubation are adequately met in the waters about these failing colonies.

I doubt whether either adverse weather or human intervention is a factor in the general failure of these colonies. R. S. Palmer's (1938) discussion of severe weather conditions as being disastrous to tern nesting along the Maine coast may have wide application but, during the four years included in this present study, I have observed many cases of failure under what appeared to be ideal meteorological conditions. Similarly, colonies considered, from repeated observations throughout the breeding season, to be quite free from human disturbances have been failures, while, in contrast to this, there is some evidence that terns prospered back in the days when the people of the region made it a practice to collect the eggs for food.

I have been unable to detect anything unusual in the daytime attentiveness of the terns at Starve Island at any time during the nesting season. Adults exchange places at the nest at frequent but irregular intervals. I have noted that sometimes a tern incubates for only a moment; sometimes for well over an hour. It may be quite normal, in the face of certain (in this case unrecognized) adverse conditions, for night incubation to relax even though daytime attentiveness continues. Perhaps this becomes increasingly true as the season progresses. There is evidence that in its earliest form this nest desertion is executed by individuals and later develops into the striking group behavior described, a development which would correlate with the statement made by Palmer (1941, pp. 107, 108) to the effect that "social behavior is most restricted when territories are first defended, but gradually occupies more time from egg-laying onward."

From the records of an extensive banding program at Cape Cod, O. L. Austin, Sr. (1940, p. 160) states that "a successful tern colony is built around an essential nucleus of sexually efficient individuals between four and ten years of age," and he has taken breeding birds as old as sixteen years. Knowledge of such a breeding span enables one to understand this species' ability to continue despite unsuccessful nesting attempts. However, if the conditions described for Starve Island continue and occur in the neighboring colonies, the island region of western Lake Erie cannot be considered a satisfactory breeding area for the Common Tern.

Summary

Night desertion of their nests, a behavior frequently initiated by a distinctive group flight at twilight and lasting till dawn, has been ob-

served on the part of the Common Terns comprising the breeding colony at Starve Island in western Lake Erie. The underlying causes for this lapse in attentiveness, which has been studied during the past three breeding seasons, are as yet unknown. Accompanying it there have been repeated, complete nesting failures, contrasting with reports of past successes.

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DOMINANCE IN WINTER FLOCKS OF CHICKADEES

BY FRANCES HAMERSTROM

THE Black-capped Chickadee (*Penthestes atricapillus*) was chosen for this study * for several reasons: it is common and so tame that it can be baited to feeders near a house, making practicable long hours of winter observation without blinds. It is easily handled and marked, it feeds in flocks in winter, and it fights—sometimes!

Flocks of Chickadees were watched in central Wisconsin from about the first of the year until spring dispersal during three winters, from a different farm house each winter. These houses were surrounded by essentially similar cover types: scrub oak, jack and white pine, and open fields.

The difficulties in gathering dominance data from a wild population were greater than I had anticipated; however, I hardly needed to disturb the birds at all. They were behaving as would any baited or winter-fed flock.

Techniques

All birds were banded with U. S. Fish and Wildlife Service bands, and some were given additional colored celluloid bands. All birds were also marked with colored tail feathers, one or two to each bird. These were either small white feathers dyed bright shades of pink, green, orange, yellow, etc., with Diamond dyes, or naturally distinctive feathers, such as Mallard speculum, Blue Jay wing, or Prairie Chicken breast feathers.

Most feathers had to be cut down in size, and then were glued and tied to the bird's own tail feathers (Edminster, 1938), or were inserted by a modification of imping. One of the birds own tail feathers was cut off near the body, leaving a hollow stub. The tip of the shaft of a colored feather was dipped in Duco Household cement and inserted in the stub.

To keep birds perfectly still while the feather marking was going on, they were stuffed head first into a woolen sock a trifle larger than a mitten thumb.

For the most part, feather marking proved satisfactory. Birds were easily recognized without the disturbance of frequent trapping and handling. Feathers stayed on an average of at least two weeks and sometimes a month, in one instance as long as 70 days, and could be recognized at 15 or 20 yards with eight-power glasses and about half as far with the naked eye. The major disadvantage was that certain colors could be seen more easily than others.

Colored celluloid leg bands were used (in addition to the colored feathers) only in 1939–40, but I found them hard to distinguish.

*Grateful acknowledgement is made to Professor Aldo Leopold and to F. N. Hamerstrom, Jr., for encouragment, criticism, and help in gathering data, as well as to Carl Leopold for data, and to Dr. J. H. Elder for critical reading of the manuscript.

The mechanical disturbance caused by the colored feathers appeared to be very slight, even when a new feather was awry. Bands appeared to annoy the birds more than feathers.

The psychological disturbance is harder to evaluate. That birds can distinguish colors appears to be beyond question (Van Eck, 1939), although I know of no experiments on chickadees or on any closely allied species.

Schjelderup-Ebbe found considerable psychological disturbance in marked domestic chickens. Crawford (1939) summarizes his experience thus: "A very suggestive type of work was begun by Schjelderup-Ebbe on the recognition by group members of individuals belonging to the group. He altered the appearance of hens' heads by covering the comb with a bonnet, or by coloring comb and head feathers with various dyes. In most cases the transformed member of the group was treated as a stranger and was forced to work her way into the closed dominance hierarchy through fighting." Heinroth (1911) suggests that birds recognize each other largely by their faces. It is possible that these hens would have ignored tail markers.

I have imped colored feathers in tails of Chickadees, Blue Jays, White-breasted Nuthatches, House Wrens, and Prairie Chickens, and was unable to notice any change in behavior as a result of wearing a colored feather. These imped passerines never appeared to lose composure for more than a moment. Upon release, Chickadees often gave the *chickadee* call, which seems to express annoyance rather than terror; often they flew straight to a feeder a few feet away and proceeded with their interrupted meal. Dominance in no way appeared to be associated with certain colors: colors used on dominant and on subordinate birds were exchanged without a corresponding change in dominance.

Prairie Chicken (*Tympanuchus cupido americanus*) cocks, on the other hand, when imped on the booming grounds, were often forced to the edge of the ground for two or three days, and showed a loss of prestige and composure. They boomed in a half-hearted way and were easily intimidated by other cocks. I am under the impression, however, that this was due to the shock of recent handling.

Flock Composition

No individual Chickadee appeared to show a preference for feeding with any other individual, and no sign of friendships or the formation of cliques was noticed. One can simply say that birds using the feeder were apt to arrive at the feeder in groups. The members of a group took turns feeding, and left the feeder together. Groups were in no way fixed, varying in size and composition from day to day, sometimes from hour to hour. Wallace (1941), on the other hand found a definite association between certain individuals in his Chickadee flocks.

For convenience sake, I am calling a "flock" all the Chickadees which visited the feeding station during a given winter.

The flocks were not constant; newcomers appeared from time to time and regular feeders disappeared from the stations, sometimes for a week or so and sometimes permanently. It was clear from the scarcity of unmarked birds by the end of the first week of trapping that the regular visitors to the feeders were caught by that time. Thereafter, again judging by the scarcity of unmarked individuals, it was clear that the new birds were being caught and marked within a day or two of their arrival at the feeder. (There was one exception: in 1940 two trap-shy unmarked birds were seen almost daily from February 5 to February 17. On February 17, two unmarked birds were caught and thereafter there were no sight records of unmarked birds until March 2, when No. 8, a new bird, came to the feeder and was marked straightway.)

Size of Flock

I was at first led to the conclusion that size of flock was definitely correlated with severity of winter; the winter of 1936–37 shows the largest flock, the most severe cold, and the deepest snow. However, I now believe that, given reasonably suitable cover, it is the food supply over a number of years which largely determines the size of the flock. At Lenox, Massachusetts, Wallace (1941) sometimes found 40 or more Chickadees coming to one feeder at the Pleasant Valley Bird and Wild Flower Sanctuary in a day. The Sanctuary has had a decade of winter feeding.

Easily obtainable food may, in rural communities, be supplied by deliberate feeding, or by ordinary farm and household practice. The combination of dishwater dumped in the snow and feed scattered for

TABLE 1

Chickadee Flock Size at Rural Stations

Observer, locality	Winter of	Total number banded	Estimated population	Number of years station was occupied by humans		Number of years previously unoccupied by humans	Distance to nearest farm or feeder
				With winter feeding	Without winter feeding		
Leopold, Baraboo	1937–8	7	7	1		4?	2/3 mi.
	1938–9	11	11	2			2/3 mi.
	1939–40	21	21	3			2/3 mi.
Hamerstrom, Hancock	1939–40	8	8	1		9	1/3 mi.
Hamerstrom, Plainfield	1938–9	7	7	1		12?	1/3 mi.
Hamerstrom, Necedah	1936–7	24	24	2	5		1/2 mi.
Ruskowsky, Necedah	1939–40	18 (1 day)	25–30	14+			1/2 mi.

chickens may serve the birds as well as a feeder.

Table 1 gives the total winter Chickadee flocks at a number of rural banding stations in different years. The population figures vary considerably. This seemed astonishing until I noticed that, with the exception of the Necedah stations, they were *growing* populations in territories unoccupied by man during the preceding several winters. The flock size was 7 or 8 the first winter of occupancy, 11 the second, 21 the third, and of the two still older flocks observed, one was known to be larger (24 birds), and the other was estimated at 25-30 birds. It would seem that it takes at least 3 or 4 years to build a flock up to carrying capacity starting from a previously unfed flock.

In other words, increase in size of a winter flock is determined not only by conditions at the moment, but also by what food was available in the preceding few winters. This deals only with upper limits: flocks may be rapidly reduced in size by cutting off the food supply, causing a shift to other feeding places (Butts, 1930).

I do not agree with Butts' conclusions: "It is thought that the feeding stations did not increase the number of birds in the area." However, his work was done where previous feeding and the proximity of human habitations had doubtless already raised the Chickadee population well above unfed levels.

The mechanism by which a flock is built up leaves much room for speculation. Why does it take more than one year to fill up good winter territories near feeders? Chickadees come into a new territory slowly—too slowly to fill it in one year. Individuals may move rather far (I know of one band return of over 50 miles; Maxon, *in litt.*), so it might appear that moving birds should be able to fill new winter territories fairly quickly. However, during winter, when good winter territories would be recognizable as such, the cruising radius is small—usually less than a half mile (Butts, 1930; Aldo Leopold, unpubl.); thus the chances of finding a new territory would be correspondingly few. Furthermore, of the birds which did come in during winter, not all stayed. Plainly, this sort of random movement into a territory could not explain the steady building up in succeeding years.

I suspect that the key lies in tradition. Instead of repeating this random building up from a fresh start, the territory begins its second winter with a nucleus of old-timers,[1] which is added to by the slow accretion just described. It seems likely that this accretion may be made up largely of juveniles. A saturation point is probably reached in time, but I do not know how soon nor at what density.

Thus, Chickadees do not move into a new territory fast enough to fill it in one year, but individuals live long enough (3 to 8 years: Butts, 1930; Wallace, 1941), and return consistently enough to maintain its

[1] A high proportion of banded old-timers have been recovered by banders, Butts (1930). Wallace (1941) recovered 9 out of 10 banded Chickadees at the same station the following winter.

continuity. It seems likely that the habits of old, experienced birds play a strong part in determining the number wintering in a desirable location. Errington (1941) has suggested that a similar mechanism may be effective in determining covey size of Bob-whites from year to year.

Fighting

Chickadees fight, but not under all circumstances. In 1936–37 there were 66 fights (4 between unidentified birds); the flock was large (12 birds, often seen daily), and weather was severe. In 1938–39 not a single fight was observed during the entire season; the flock was small (3 or 4 birds seen daily) and weather was considerably milder. In 1939–40 the weather was again mild for the most part, though not as mild as in the preceding year. The flock was small—more than 3 birds were seen on only one day. Ten fights were seen during the season.

From my own data it would seem that the amount of fighting was proportional to the severity of the weather; however Mary Ruskowsky told me that she saw many fights in her large flock in 1939–40, the same winter in which I saw only 10 in a small flock. The behavior of the Ruskowsky flock would lead one to suspect that the size of the flock has more influence on the amount of fighting than does the weather.

Year	Max. no. birds seen per day	Severity of winter	No. of fights	No. fights per bird per day	Observer
1936–37	12	Very severe	66	.24	F.H.
1938–39	4	Mild	0	0	F.H.
1939–40	4	Moderately mild	10	.13	F.H.
1939–40	19+	Moderately mild	many	?	M.R.

Dominance

The order of dominance for any two birds was clear, but for the flock as a whole it was so complex that attempts to arrange the birds in precise order of dominance failed. As can be seen from Figure 1, dominance is largely uni-lateral. Schjelderup-Ebbe describes this type of dominance for domestic chickens as follows: "The 'peck right' was found to be uni-lateral, i.e., in 1,900 observed instances of pecking, if animal A once succeeded in worsting B, B thereafter was never observed to peck A, except on the rare occasion of a general revolt against the despot" (Crawford, 1939).

Of 76 observed fights in Chickadees in two winters, only one reversal was noticed. In 1937, No. 8 vanquished No. 10 once and was vanquished by No. 10 once; both these birds stood high in dominance. They usually won fights and were very pugnacious.

All the observed fights were about food.[2] About 1,051 feedings were noted during the winter of 1936–37, and of these, 66 involved fights.

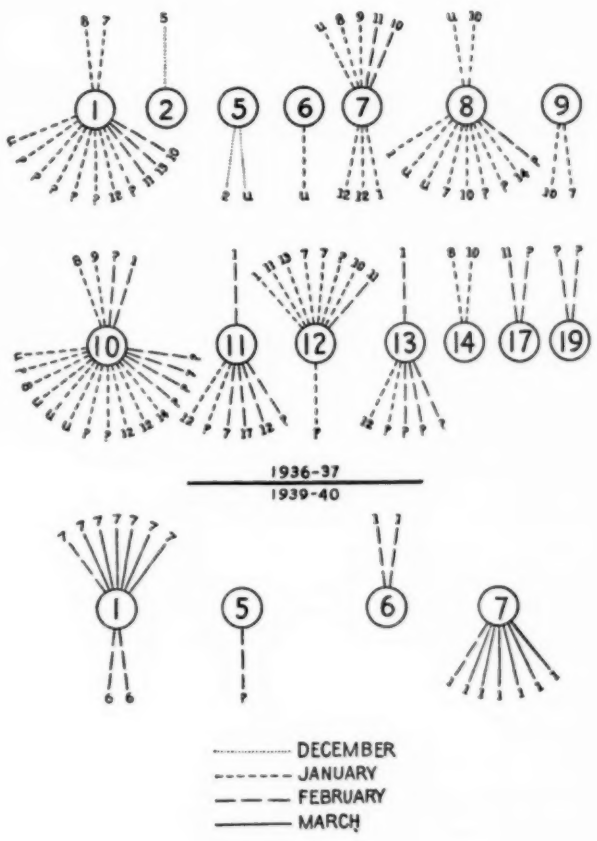

Figure 1. Fighting record.

Each diagram gives the fighting record of the individual within the small circle. Each line extending from the circle represents a fight in which the encircled bird vanquished another if the line extends below, and lost to another if the line extends above.

For example, bird No. 7 in 1936–37 vanquished No. 12 twice and No. 1 once. He was vanquished by No. 8, No. 9, No. 10, and No. 11, and by an unbanded bird new to the station. Unidentified birds are indicated by question marks.

[2] In addition to the fights listed, I saw four contacts of a very different nature: one bird flew at another. These flurries looked like Nice's (1934) description of the nuptial pounce of the Song Sparrow. These occurred on January 17, February 6, and twice on February 7, in 1937. Some of the spring fighting in 1940, though indistinguishable from earlier fighting at the feeder, may have had to do with mating behavior.

In 1939–40, 10 of 417 observed feedings involved fights. Care was taken to distinguish between fights and half-hearted encounters in which the birds did not actually touch each other. The latter were not recorded as fights.

It is reasonable to suppose that subordinate birds would often give way before a fight was precipitated. In fact Odum (1941a) uses this as a criterion of dominance in Chickadees at Rensselaerville, New York. I was unable to distinguish between giving way and peaceable exchange of position at the feeder when one bird was through and another came to take its place, so included only actual fights. Simple feeder replacements without fighting did not appear to be correlated with dominance, perhaps because I was unable to recognize the milder forms of hostility and to separate them from peaceable exchange.

Although all fighting occurred at the feeders, no significant relationship between fighting ability and *number* of feedings was found. The birds that fought most often fed most often, whether they won or lost. In 1936–37,[3] dominant birds fed slightly more often than subordinate birds, and subordinate birds fed slightly more often than the neutrals. In 1939–40, however, of the two birds using the feeder most often, the subordinate No. 1 averaged 5.6 feedings per day to the dominant No. 7's 5.2 feedings per day. There may be an advantage in being a fighter, whether a winner or a loser; on the other hand, the fact that losers fed almost as often as winners may be explainable otherwise:

(1) Birds concentrating near the feeder would tend to feed under crowded conditions and therefore be apt to fight more.

(2) The losers, having had their meals interrupted, may have had to come to the feeder more often than if they had been allowed to feed uninterrupted. Actually, vanquished birds were just as apt to feed immediately after battle as not. Nine times losers left the feeder after fighting and did not return straightway, but in 14 instances losers waited nearby and fed immediately after the winner ceased eating.

There may be a relationship between fighting ability and *amount* eaten at the feeders. In order to get as much to eat as winners, losers should have had to feed more often than winners. This was the case in the small flock in 1939–40. No. 1 at the bottom of the peck order fed more often than No. 7 at the top. In 1936–37, when the flock was large, losers did not feed as often as winners. I suspect that the influence of dominance on opportunities for feeding is negligible in small flocks but increases as flocks become large or the food supply becomes inadequate.

Behavior Toward Newcomers

Intolerance toward newcomers was demonstrated in 1936–37, although only by certain individuals, particularly by No's 10, 8, and 1. Of 66 battles, only 22 were between old-timers (banded birds). After

[3] No. 5 bird and the neutrals, with two exceptions, were in the territory less than five days each, so the data for them are very scant. "Neutrals" are birds which were never seen to fight.

the first week of trapping there was always a great preponderance of banded birds near the feeders, so chance encounters would be more apt to result in fights between old-timers. However, it appears that new birds were more apt to be involved in fights. Moreover, after the first week of trapping, no banded bird ever won a fight until he had been in the territory at least three days.

Further, old-timers appeared to have the advantage in their early encounters with newcomers: banded birds vanquished unbanded birds (newcomers) 9 times and unidentified birds (probably newcomers) 22 times, but were vanquished by unbanded birds only twice, by unidentified birds 5 times. It is likely that many of the unidentified birds were also newcomers, as the presence of colored feathers and bands was easy to detect; still, the fights were so quick that it was sometimes difficult to identify both participants.

Although Odum's (1941b) criteria of dominance differed from mine, he noted a similar attitude toward newcomers. Having moved birds from one flock to another, he observed that the new birds were subordinate to the resident birds the first day; however, they were not driven away. A few of the introduced birds stayed in the new range, displacing some of the resident birds and apparently finding their proper level in the flock.

In 1939–40 practically no intolerance toward newcomers was noticed. Of 10 fights only one was between a banded bird and an unidentified bird, a probable newcomer. This, together with the fact that no fights were seen during the winter of 1938–39, makes it seem likely that intolerance toward newcomers appears only in the larger flocks.

Behavior of Newcomers

Newcomers appeared to be at home in the territory within a few hours and were as apt to win as to lose fights from the second day on, depending upon their individual prowess. However, in 1936–37 no bird arriving after January 21, and in 1939–40 no bird arriving after February 3, ever won a fight. This may have been because the newcomers were subordinate birds which had been forced out of other territories, or it may have been an early spring movement of females into the territory.

At the very first, the behavior of newcomers in the territory was strikingly different from that of the regular visitors, but the difference is difficult to describe. New birds flew to the feeders uncertainly, and showed even more uncertainty in selecting perches and "paths" to and from feeders. I could almost always detect a new bird before I saw that it had not been banded. This uncertainty of behavior may have caused the others to pick on him.

Idiosyncrasies in Feeding

I had wondered whether subordinate birds would be forced to feed earlier or later, i.e., at "inconvenient" times. There were no favorite

feeding hours for any of the birds nor for the flock as a whole. Any bird was apt to feed at any hour of the day, regardless of his position in the hierarchy.

Birds that had been in the territory for some time formed habits which were extraordinarily persistent. For example, it was the custom of No. 1 (1940) to rotate around a piece of suet when feeding, while No. 7 (1940) faced southwest, squatted well down on his tail, and hammered awkwardly away. Upon leaving, No. 7 usually perched on the edge of the tray for a moment, but if he left in a hurry, he touched with his feet the spot where he usually perched and then flew on. I never saw him fly away without either sitting on or touching this spot.

Behavior of a Cripple

No. 8, a crippled bird, appeared on January 5, 1937. One tarsometatarsus had been recently broken near the foot and was badly swollen. He was plainly much handicapped, and was obliged to hang from the feeder (a hanging bag of suet) by one foot and to flutter while feeding. By January 19 the swelling had almost disappeared but he still fed awkwardly. A glance at Figure 1 shows that he stood high in order of dominance and indulged in a more than average number of battles, of which he won 9 of 11. He lost one fight to an unbanded bird and one to No. 10, the best fighter of the whole flock.

The cripple did not appear to be particularly dependent on the feeders, but used them about as often as the average good fighter.

Speculation on the Role of Dominance in the Wild [4]

It is not inconceivable that dominance looms progressively more important as more primitive conditions are reached. Suburban Chickadees, if forced away from the feeder, stand a very good chance of finding a new food supply within a block or two, rural Chickadees, within a mile or two; but Chickadees entirely dependent upon wild food might well be at a grave disadvantage if severe weather not only taxed their strength but also cut off part of their food supply.

The largest flock of Chickadees I ever saw far from human habitation was in the vicinity of a dead skunk which had been partly scavenged by some fairly large animal. The skunk was presumably an easy food supply. In the case of a prolonged ice storm, the small wild foods on which Chickadees usually subsist might be unavailable, but the fairly large animal might continue to scavenge on the carcass, thereby exposing it again to the Chickadees. As long as the carcass lasted, it would serve as a feeding station, and dominant and subordinate birds alike could eat. Once it was gone, all alike would starve.

In such a case dominance would have no survival value. Suppose, however, that by the time the carcass had been finished, a very small

[4] The idea that dominance may have survival value is not a new one. Noble (1939) states: "It is to a fish's advantage to be at the top of the peck order because the dominant fish in the long run secures more food and more mates."

amount of food could be gleaned through cracks in the ice-coated trees—but so little that each "find" was food enough for only a bird or two. The dominants would clearly have the advantage, to the extent that the subordinates might die of starvation and cold.

So dominance might result in forcing vanquished birds away from a limited food supply to their death. Moreover, the resulting mortality might be selective in favor of one sex. Allee (1938) has found that, when the breeding season is not in progress, in some species the males dominate over females, in others the females over the males. The two birds I succeeded in sexing did most of their fighting toward spring, when the male was dominant over the female, however, this female was the winner of two encounters with another bird. I did not determine the sex of any of the regular winter fighters. However, a high proportion of one sex might die, upsetting the sex ratio and thereby slowing up the population recovery for a few breeding seasons. A sex differential in winter-killing of Bob-whites has, in fact, been observed (Hawkins, unpubl.), although its mechanism is unknown.

Conclusions

Chickadees are only momentarily disturbed by banding and imping of tail feathers.

Winter feeding, whether deliberate or not, is apt to increase the size of the flock. At rural feeders the upper limit was not reached until at least the third year after feeding started—possibly not even by then.

Less fighting was observed in small flocks than in large.

Dominance is not linear, but is practically uni-lateral (one reversal in 76 fights).

Poor fighters did not appear to be at a disadvantage in using the feeders; they ate almost as often as good fighters. They may have been forced to come back more often, having had less at each feeding.

A cripple was high in dominance.

Newcomers can be detected by their behavior.

There appears to be some tendency for other birds to pick on newcomers, particularly in large flocks.

Survival value: I found no evidence that the individual's chance for survival is affected by his rank, at least as far as feeding is concerned. Survival value might be influenced by dominance when the flock is very large or food scarce.

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THE "INJURY-FEIGNING" BEHAVIOR OF THE FLORIDA NIGHTHAWK

BY IVAN R. TOMKINS

THIS paper presents an account and an interpretation of certain behavior in the breeding adult and the nestling young of the Florida Nighthawk (*Chordeiles minor chapmani*). This particular behavior has been called "injury-feigning" and many other names that are based, in part at least, on the belief that the bird actually pretends to be crippled or injured in order to draw the attention of an enemy away from the eggs or young. During the past few years there has been considerable discussion in our scientific journals of this kind of behavior, and several attempts have been made to explain its meaning.

I believe that the behavior of very young Nighthawks, as described here, throws new light on the pattern followed by the adult female in her display, and allows us a better understanding of its meaning.

The account given here is based on the performance of about twenty-five Nighthawk families observed in the vicinity of Savannah during the past six years.

On the open sandhills along the lower Savannah River there is in summer a large and relatively stable Nighthawk population. The birds nest wherever there is open dry ground, that is, ground fairly clear of vegetation. The species is solitary in nesting. It is an easy bird to observe because it is often quite tame and will allow a close approach before leaving eggs or young.

Pickwell and Smith (1938) have given a good account of similar behavior. Wherever mention is made in this paper of their account, it should be remembered that they wrote of a different species, the Texas Nighthawk (*Chordeiles acutipennis texensis*).

Behavior of the Female

The female Nighthawk, according to my observations, incubates the eggs, and she alone hovers the young or shields them from the hot sun. So it is that only the female has a nest-defense display of this character. Not once have I seen the male incubating eggs, hovering young, or in any marked part of the defense display, other than occasionally chuckling while flying overhead when the young were nearly grown. He usually occupies a perch somewhere within a couple of hundred yards, for he remains with the family group at least until the young are able to fly well.

Pickwell and Smith (1938: 209) report that the male Texas Nighthawk sometimes broods the young at night, and sometimes displays as does the female. J. H. Bowles (1921) reports that the male Pacific Nighthawk (*Chordeiles virginianus hesperis*) fed the young at night.

I have not been able to watch our birds at night, hence am unable to report on that phase of activity.

When the incubating female is first approached, she sits quietly in the natural position, with head neither unduly raised nor lowered, and with eyes nearly closed. (Most of my observations have been in full sunlight). This is the "concealment by self" of Pickwell and Smith. Though this term is probably correct from one viewpoint, the bird actually does nothing. It does not draw its head down, as does the Willet (*Catoptrophorus semipalmatus*), for instance. I have watched Nighthawks at considerable distance, then walked up to them, and have

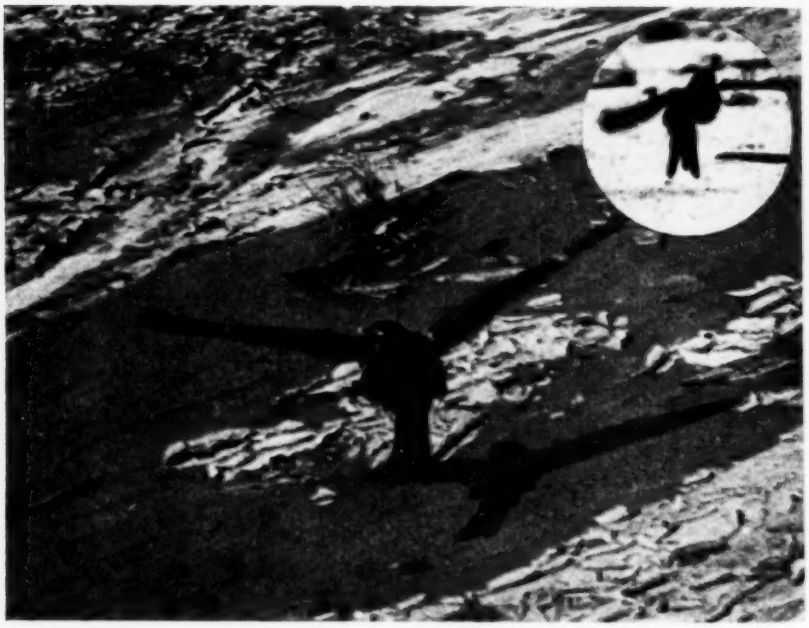

Figure 1. Tail-depressed flight of the Florida Nighthawk as it leaves the nest.

found the normal incubating position held until I was very close, usually until the bird flushed from the nest. Sometimes as the incubating bird is approached, she will—if a relatively tame bird that allows a close approach—give a throaty chuckle or grunt, perhaps opening her mouth a little. At other times she leaves the nest with no preliminary action at all, the first motion seen being the sudden movement of the wings to lift her from the ground. Perhaps this chuckle or grunt is the "intimidation-display" of Pickwell and Smith. I have found nothing else in our birds which could be so described.

Our Nighthawks, when flushed from eggs or young, go through a performance that seems to vary in different individuals, but when it is divided into parts, the parts themselves are quite definite and stable. Nevertheless, I am still not at all certain that these parts have separate and definite meanings. In other words, possibly the whole flushing display is one performance, varying perhaps according to the degree of timidity of individual birds, or with a distinction lying in certain mechanical limitations, such as the impossibility of behaving the same in flight as on the ground.

For the above reason, and for the purpose of the discussion later, the after-flushing behavior will be divided into three parts.

Figure 2. Extreme display by the brooding female Nighthawk.

I. This is the flight performance of the female leaving eggs or the vicinity of the young. In it she flies directly away with her tail pointed down at the ground and somewhat spread. That is, the tail points almost vertically downward, giving the bird an odd and labored flight. Photographs show the position better than words can describe it (Figure 1).

This distinctive and labored flight is very easily observed. The female uses it at all times when flushed from eggs or young, though a very shy bird may show the tail-depressed flight for only a short distance. Since I first noticed about six years ago that it indicates a brooding bird, I have not observed a single deviation—no bird has flushed in such a situation without showing it in some degree, and no bird has shown it when not engaged in incubating eggs or caring for

young. No male has exhibited it in the slightest degree, as far as I have seen.

If the bird is shy, Action I is the only part of the behavior seen, for she soon abandons the tail-depressed flight and leaves the vicinity. A large percentage of the birds remain near by, and go through all or a part of the rest of the performance.

II. This is the part in which the bird alights some little distance away, spreads wings and tail, and cowers there quivering. If one approaches, she flies off or teeters away with wings and tail still spread. If one moves away, she may follow and repeat.

III. The final part is seen when she opens her mouth wide and hisses, generally turning head or body toward the intruder (Figure 2). A very bold individual will hiss and teeter around, all the time moving closer to the nest, until she settles on eggs or young and is quiet again. In the latter case she may continue to spread wings and tail, or may fold them when walking toward the nest.

Mrs. Nice, in commenting on an earlier draft of this paper, suggested that many birds show three different types of reaction to a nest enemy: They may attack, attempt to intimidate, or go through deflection tactics tending to lure it away, depending on the character of the stimuli offered by the situation and the behavior of the enemy. It has so far proven unsatisfactory to divide the behavior of my Nighthawks thus, though the possibilities presented by studies in that direction are interesting to consider.

Pickwell and Smith found one bird that reacted differently when approached by a human walking upright than it did when he approached on hands and knees. They tried the same experiment on other birds, but without results. After reading their account, an approximation of their two ways of approach was tried on three different Nighthawks with negative results. That is, the birds presented the normal flushing behavior to both methods of approach. At another time one of these three birds was tested by sliding a long slim reed toward it much in the way a snake might approach. The bird remained motionless until the reed nearly touched it, then flushed with the usual tail-depressed flight.

Behavior of Nestling Young

Young birds in the nest have a display which is very similar to Actions II and III of the adult female. When teased, some of them will open their mouths, spread wings (and tail, when partly fledged), and hiss at the intruder, often lunging forward to bite at an extended finger. This reaction was obtained from several young birds, from four or five days old on through the pre-flying period. The pattern was constant for all which began the performance (Figure 3).

Bent (1940: 239) quotes an account by Ernest E. Seton (1890: 554) of similar behavior in the young of Sennett's Nighthawk (*C. m. sennetti*), and Pickwell and Smith reported and photographed it in the species they studied, but not before the birds were twelve days old. The behavior they noticed appeared to be somewhat less than found here in the present species.

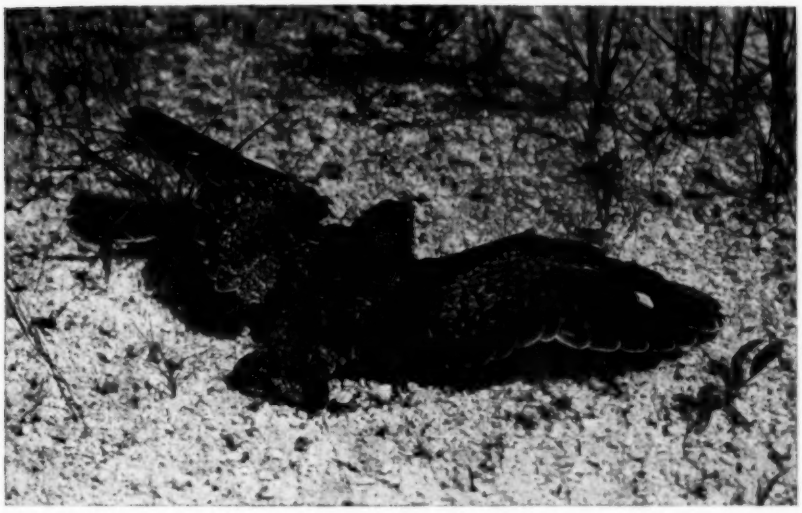

Figure 3. Defense display of the young Nighthawk.

Discussion

The old belief that the display is a theatrical act in which an able bird simulates an injured helpless one, was based on an anthropomorphic concept. It is doubtful whether any scientifically-minded ornithologist of the present day believes in quite this explanation. Yet there is much in the performance to encourage that view.

F. C. R. Jourdain (1936-1937) has reviewed the subject of "injury-feigning," but his account has not been accessible to me. Henry Mousley (1937) has also recapitulated much recent theory in a paper dealing with similar behavior in the Spotted Sandpiper (*Actitis macularia*). Herbert Friedmann's theory (1934) concerning this behavior is that the bird suffers from a conflict between the fear emotion and the reproductive emotion and there results an actual muscular inhibition which makes it impossible for the bird to fly. (See also Stone, 1935).

Mousley considered that the male sandpiper which he observed (this male bird had incubated the eggs and was then caring for the young)

was more likely the victim of an emotional conflict and actually driven crazy or demented, than that he deliberately displayed to attract attention. This is much like the Friedmann theory.

Often it appeared to me that the female Nighthawks used such portion of the display as they wished, that is, it was repeated in part by apparent intention at times. This prevented it being considered as an emotion-conflict. Rather it resembled the "desired reflex action" of Lorenz (1937).

An effort was made to consider the three parts (Actions I, II, and III) and correlate them with the major emotions the brooding bird might be subject to on the approach of an enemy. The result was not a success.

No rational explanation of the display of the adult Nighthawk was found, until the display of the young bird was seen, and the similarity of patterns noticed. The physically weak birds in the nest could not go through all the display of the adults, but the part which they could perform was done in the same manner and under quite similar stimuli. Possibly the tail-depressed flight (Action I) of the adult is also the flight equivalent of the display of the young.

Why should the young bird have a display like that used by the adult? Possibly the question should be turned around to ask why the adult should follow the same pattern as the very young bird. The answer seems to be that the two are identical and are instinctive, a conclusion which is supported by the fact that many different individuals follow the ancestral groove. If it were learned, or an intentional act, there would be much variation.

By acceptance of this conclusion we have two major things involved:

a. An inherited pattern which often to our minds appears like a simulation of being crippled.

b. The use of it by the female Nighthawk in a particular part of the period of reproduction under the combined stimuli of the situation as well as under some volitional control on the part of the individual bird.

This concept of the display has been more satisfactory to me than anything that has been offered. There are many instinctive behavior patterns to be found all through the vertebrate kingdom, and we shall probably never be able to trace the exact origin of this one. It seems to be instinct, pure and simple. "An instinct is a propensity prior to experience and independent of instruction" (Paley).

My thanks are due to Mrs. M. M. Nice for much advice and constructive criticism, and to Dr. J. Van Tyne for his encouragement and assistance.

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513 EAST DUFFY STREET, SAVANNAH, GEORGIA

GENERAL NOTES

European Widgeon in the Pymatuning Region of Pennsylvania.—Four times during the year 1941, I have observed the European Widgeon (*Mareca penelope*) in the Pymatuning region of Crawford County, Pennsylvania. On each of these occasions the bird seen was a male and invariably it was in the company of Baldpates (*Mareca americana*). All were observed at reasonably close range with eight-power binoculars. The first record was that of a bird seen at a small pool of open water in the ice off the Espyville-Andover causeway on April 3. On April 9, one was present on the marsh at Hartstown. On May 1 there was one near the eastern end of the lake within the Pymatuning Refuge. On October 15 one was observed within the refuge just outside of the town of Linesville. The latter bird remained in the same location and was seen almost daily until October 31.—William C. Grimm, *Linesville, Pennsylvania.*

An Unusual Clutch of Marsh Hawk Eggs.—On April 24, 1941, I discovered a Marsh Hawk (*Circus hudsonius*) nest on the Rose Lake Wildlife Experiment Station area in Bath Township, Clinton County, Michigan. The nest contained one egg. A summary of subsequent observations on the nest follows: April 28, three eggs; May 8, seven eggs; June 2, seven eggs and three young; June 11, three eggs and seven young. The three eggs left proved to be infertile. Thus ten eggs were laid. Neither T. S. Roberts ("Birds of Minnesota," 1, 1936 : 342) nor A. C. Bent (*U. S. Nat. Mus. Bull.* 167, 1937: 82) records nests with more than nine eggs.—Philip S. Baumgras, *Game Division, Michigan Department of Conservation, Lansing, Michigan.*

Great Horned Owl Makes Second Nesting Attempt.—During each of the 1939 and 1940 breeding seasons Mr. John C. Scharff, Superintendent of Malheur Refuge, and the writer noted that incubating Great Horned Owls (*Bubo virginianus*) had been shot on the same nest in a willow tree on the bank of the Blitzen River in the Blitzen Valley, Harney County, Oregon. We thought that perhaps the bird occupying the nest the spring of 1941 might be induced to move to some other locality if robbed of her eggs. Therefore I removed the entire clutch of 4 eggs on March 19. The eggs were saved for laboratory reference material. Three weeks after the eggs were removed a bird was again noted in an incubation posture on the nest and examination of the nest revealed 3 eggs. It was apparently the same bird that had been robbed, as the pair had been noted in the vicinity of the nest during the intervening period. The nest was not bothered further during the season, and as a result a brood of 3 were hatched and reared in the vicinity.

A pair of dark phase Swainson's Hawks (*Buteo swainsoni*) had used this same nest and reared young on it during the 1938, 1939, and 1940 seasons. They occupied the nest during the 1939 and 1940 seasons shortly after the owls had been shot. During the spring of 1941 a dark-phased pair of Swainson's Hawks was noted in the vicinity of this nest on several occasions while the owl was incubating her second clutch, at a time when other hawks were already beginning to nest. They evidently gave up waiting for the nest and built a new one 175 yards down stream from the nest occupied by the owl. There they reared their young. We observed no antagonistic action between these two raptors.—Clarence A. Sooter, *Fish and Wildlife Service, Malheur National Wildlife Refuge, Burns, Oregon.*

The Subspecific Status of Michigan Flickers.—During the course of routine work on the bird collection of the University of Michigan Museum of Zoology, I had occasion to investigate the subspecific status of the Michigan Flickers. It was thought that those breeding in northern Michigan might be *Colaptes auratus borealis*, since Wetmore (Auk, 57: 113, 1940) found that *borealis* bred as far south

as northern Minnesota. However, specimens from the northern part of Michigan are scarcely larger than those from the southernmost counties. Eleven adults from the upper peninsula of Michigan, including Isle Royale, have the wing 149–162 mm. Fifteen from the northern part of the lower peninsula, including the islands in Lake Michigan, also measure 149–162 mm. The wings of twenty-three birds from southern Michigan vary between 146–161 mm. Since these measurements are all well within the range of *Colaptes auratus luteus*, the breeding Flicker throughout the state of Michigan must be referred to that race.

Two autumn specimens are remarkable for their large size. One of them, a male with the wing 171 mm. long, was collected by J. B. Steere at Ionia, Ionia County, Michigan, during October, 1876. The other, also a male, has a wing length of 167 mm. It was taken by J. Claire Wood in Ecorse Township, Wayne County, Michigan, on September 30, 1893. These two birds are as large as breeding specimens of *Colaptes auratus borealis* from northern British Columbia and are without doubt migrants of that race. Other fall and winter specimens examined are all referable to *luteus*.

The Boreal Flicker has not previously been recorded from Michigan.—Pierce Brodkorb, *University of Michigan Museum of Zoology, Ann Arbor, Mich.*

Notes from Northeastern Oregon.—The Blue Mountain region of northeastern Oregon has received relatively little attention ornithologically. The following contributions are offered with the idea of adding to the splendid introductory data contained in Gabrielson and Jewett's "Birds of Oregon" (1940).

La Grande, Union County, in the vicinity of which most of these observations were made, lies at the west edge of the Grande Ronde Valley, at an elevation of 2,700 feet. A tongue of the Upper Sonoran Zone vegetation, characterized by greasewood (*Sarcobatus vermiculatus*) and rabbit brush (*Chrysothamnus nauseosus*), occupies the valley floor where it is not planted to wheat or other crops. Almost as soon as the surrounding hills begin to rise the ponderosa pine (*Pinus ponderosa*) and Douglas fir (*Pseudotsuga taxifolia*) of the Transition zone dominate up to an elevation of 5,000 feet or more, at which point they give place to Engelmann spruce (*Picea engelmanni*) and alpine fir (*Abies lasiocarpa*) of the Canadian Zone which extends up to 6,000 feet, the highest point (Mount Emily) in the vicinity of La Grande.

Columbian Sharp-tailed Grouse (*Pedioecetes phasianellus columbianus*).—In early January, 1940, Dr. Elmo Stevenson, then of Eastern Oregon College, showed me a flock of about a dozen some 25 miles northeast of La Grande, near Elgin. The birds had their headquarters among scattered Douglas firs in a gully surrounded by wheat and other farm land. On February 15, 1941, after an all day search, two other observers and I glimpsed five of these birds flushed just at sunset, in the same vicinity. The farmers of the region have co-operated with the State Game Commission in creating a preserve in an attempt to save this, one of the few remaining bands of Sharp-tails in Oregon.

Catbird (*Dumetella carolinensis*).—On June 29, 1940, I located a pair feeding two young recently out of the nest in a dense thicket near an irrigation ditch in the Valley about five miles southeast of La Grande. After some searching the nest was found in a shrub about five feet above the ground. It contained a punctured Catbird egg which I collected along with the adult male. Several other pairs of Catbirds were located in the vicinity of La Grande. Natives who know the bird say it has occurred here for at least 25 years. Gabrielson and Jewett (*op. cit.*, p. 462) say that it "undoubtedly breeds, although there are no actual breeding records."

Audubon's Warbler (*Dendroica auduboni*).—Judging from last winter and this one, Audubon's Warbler may be expected much later in the fall in eastern Oregon than has previously been supposed. Gabrielson and Jewett (*op. cit.*, p. 504) mention "a single straggling record" for Wasco County, January 2, 1917. Otherwise

their latest date for the region east of the Cascades is October 24. To this I should like to add the following sight records (and the unmistakable call-note heard): November 3, 1940, one at Pendleton; and for La Grande four occurrences—November 11, 1940, one; November 26, 1941, two; December 1, 1941, one; December 30, 1941, one.

Pine Grosbeak (*Pinicola enucleator*).—A female or immature bird was watched at a distance of about twenty feet for about a minute in fir woods at an elevation of about 4,500 feet near Mount Emily on August 3, 1940. On the basis of two specimens taken in worn breeding plumage in September, Gabrielson and Jewett (*op. cit.*, p. 541) state that *P. e. montana* "probably breeds" in the higher Wallowas.

Green-tailed Towhee (*Oberholseria chlorura*).—An adult accompanied by an immature bird seen on a brushy hillside in the lower portion of the Transition zone near La Grande, and adults in song in the springs of 1940 and 1941 indicate that the bird is a regular breeder in Union County. Gabrielson and Jewett (*op cit.*, p. 551) record it from Baker, the county adjoining Union County on the south.

Western Tree Sparrow (*Spizella arborea ochracea*).—On December 8, 1940, I studied a Tree Sparrow for five minutes at close range in a brushy, weedy area in the Valley four miles east of La Grande. Another was seen near Elgin on February 15, 1940. One was seen to fine advantage in the Valley about five miles east of town on December 26, 1941. Gabrielson and Jewett (*op. cit.*, p. 573) record specimens from Baker and Wallowa counties, which adjoin Union County on the south and east, respectively.—A SIDNEY HYDE, *Eastern Oregon College of Education, La Grande, Oregon.*

A Rock Wren Specimen from Michigan.—My friend, Dr. Max M. Peet, recently remarked to me that he had once seen in Michigan a species of bird which he felt sure was not represented by a Michigan specimen in the University collection. The bird, it turned out, was a Rock Wren which he saw unmistakably from a railway train which was drawing very slowly into the Detroit station. He was familiar with the species in the West and recognized it instantly. The bird was tame and he had a very good look at it for several minutes. This happened in the fall "five or six years ago" but he had not made any note of it because it seemed to him so obviously a stray that had been accidentally transported from the West in a freight car.

This incident caused me to bring out from the collection and restudy a Rock Wren (*Salpinctes obsoletus*) which had long lain there, at first not recognized and later not taken seriously. The specimen came to the University of Michigan Museum of Zoology by gift of Bryant Walker after J. Claire Wood's death in 1916 and was catalogued No. 50838. It is a normal specimen of Rock Wren in somewhat worn and soiled plumage. It is typical of the J. Claire Wood "make" of bird skin and bears the original label with the following data in his handwriting: "Carolina Wren. ♂, Oct. 31, 1910. From pile of railroad ties at D. S. Crossing, Sec. 24, Monguagon Township, Wayne County, Mich." His brother, Walter C. Wood, writes me from Detroit that that entry occurs in the original catalogue now in his possession. The only other birds taken that day were Pine Siskins and a Red-tailed Hawk.

Several facts have a bearing on this erroneous identification of the specimen. J. Claire Wood was not familiar with the Rock Wren and had none in his collection. P. A. Taverner calls my attention to the fact that the Carolina Wren "was just extending into Michigan" at that time and Wood's associates had recently taken specimens. (See *Auk*, 27, 1910:141; *Auk*, 29, 1912:107; *Wilson Bull.*, 24, 1912:129). He was therefore interested in and looking for Carolina Wrens. In the papers of James B. Purdy we find a letter of February 28, 1911 from J. Claire Wood asking for Purdy's Wayne County records of the Carolina Wren, adding that as "soon as I hear from you I will prepare my notes for the Auk." Apparently the note was never published.—JOSSELYN VAN TYNE, *University of Michigan Museum of Zoology, Ann Arbor, Michigan.*

A Bird Housing Project at Hanover, New Hampshire.—During March of 1941, the Junior Nature Club of Hanover constructed fifty bird houses designed for Bluebirds and erected them along the four roads leading out of the village. Members of the club helped to examine the boxes each week until school closed in June and then this inspection was performed by Wendell Cox, one of the more active members, for the remainder of the nesting period.

The boxes were inhabited by Bluebirds (*Sialia sialis*) and Tree Swallows (*Iridoprocne bicolor*). Nest building by the Bluebirds began during the week of April 7 to 12 during which four nests were completed and six others begun. The first Bluebird eggs were found on the inspection of April 23. The first Tree Swallow eggs were found April 30, although this nest was deserted after the laying of the second egg; additional eggs were not found until May 14. The Bluebirds had two periods of nesting: April 23 to May 29, and May 30 to July 31. The one nesting period of the Tree Swallows extended from the week of May 14 to July 1, excluding the first unsuccessful attempt.

The number of boxes occupied by Bluebirds during the first and second nesting periods, and the number of eggs laid during each period, were approximately the same. The percentage of success, however, was much greater for the second period, 91.2 per cent as compared with 65.6 per cent (as based on the number of eggs laid) for the first period. This difference was due primarily to the interference by Tree Swallows which began their nesting about the middle of the first period of nesting of the Bluebirds. There was no interference by English Sparrows. The nesting success of the Tree Swallows was much lower than that of the Bluebirds, being 46.6 per cent.

	Tree Swallow	Bluebird		
		1st Period	2nd Period	Total
Number of nests	16	14	15	29
Number of nests with 2 eggs	1	0	0	0
Number of nests with 3 eggs	0	1	2	3
Number of nests with 4 eggs	5	4	3	7
Number of nests with 5 eggs	7	6	10	16
Number of nests with 6 eggs	3	3	0	3
Total number of eggs	75	67	68	135
Average number of eggs per nest	4.56	4.8	4.5	4.63
Number of sets of eggs unsuccessful	6	3	1	4
Number of young fledged successfully	35	44	62	106
Percentage of success based on number of eggs laid	46.6	65.6	91.2	78.4
Average number of young hatched per nest	2.18	3.1	4.1	3.6

Richard Lee Weaver, *Dartmouth College, Hanover, New Hampshire.*

Orchard Oriole at Hanover, New Hampshire.—While assisting with a bird census by the Dartmouth Natural History Club, Richard DeCou heard the song of an Orchard Oriole (*Icterus spurius*) along the highway one mile south of Hanover on May 15, 1941. He eventually located the bird and verified the identification and then notified me and others who had an opportunity to see and hear the bird. It remained in the vicinity of the poplar trees where first seen until May 23. It was courting a female Baltimore Oriole and was being attacked by a male Baltimore Oriole. We repeatedly saw vigorous fights between the males. The Orchard Oriole followed the pair of Baltimore Orioles about as they collected nesting materials and visited their various perches.

The records for this bird in New Hampshire and Vermont are very few. I know of the following records: two males collected June 1, 1883 at Middlebury, Vermont; an adult and young observed at Brattleboro, Vermont (undated but prior to 1909) according to G. M. Allen (*Occ. Papers Boston Soc. Nat. Hist.*, 7,1909:140); one at Rollinsford, New Hampshire (undated but prior to 1909) G. M. Allen (*loc. cit.*); one second-year male collected by C. F. Goodhue May 14, 1922, in New Hampshire (exact locality not given); and one male identified at the Isles of Shoals on June 17, 1936, by C. F. Jackson.—RICHARD LEE WEAVER, *Hanover, New Hampshire.*

Harris Sparrow at Malheur Refuge, Oregon.—While observing small passerine birds in the vicinity of the headquarters of the Malheur National Wildlife Refuge, Burns, Oregon, on October 26, 1941, I noted two Harris Sparrows (*Zonotrichia querula*) feeding in the greasewood and sagebrush growth just north of the lookout tower. When disturbed, the birds perched on top of a greasewood bush for several minutes. John C. Scharff and Paul T. Kreager also saw these birds. We all observed them in a good light at about 20 yards with seven-power binoculars. Gabrielson and Jewett ("Birds of Oregon," 1940:575–76) list Harris Sparrow as a rare winter straggler and cite only two records in Oregon: at Medford, February 1 and 2, 1912; and at Hillsboro in January and February 1932.—CLARENCE A. SOOTER, *U. S. Fish and Wildlife Service, Burns, Oregon.*

Winter Records of the Slate-colored Junco and Harris Sparrow in Utah.—Heretofore considered accidental, but probably constituting regular winter visitors to Utah are the Slate-colored Junco (*Junco hyemalis hyemalis*) and the Harris Sparrow (*Zonotrichia querula*). Their status as accidental has been based largely on the scarcity of records of the two species, but it appears more likely that few specimens have been collected in the state because of little winter field work having been done. Furthermore, there is the possibility of the two species having been often over-looked since they occur among flocks of other birds.

The Harris Sparrow has been recorded from Utah but twice in the literature. J. S. Stanford (*Proc. Utah Acad. Sci.*, 15, 1938:145) was the first to record the species in the state when he listed a specimen taken April 17, 1937 at Wellsville, Cache County, Utah. A. M. Woodbury (*Condor*, 41, 1939:162) mentions a specimen taken by E. R. Wilson February 9, 1937, at Centerville, Davis County, Utah. Observations by Wilson as reported by Woodbury indicate that Harris Sparrows were common around Centerville from January 1 to March 15, 1937. They were noted there again during the winter of 1937–38 but not in 1938–39. Both of these localities are in central northern Utah.

One of us, Behle, collected a female in the extreme southern part of the state on December 16, 1939, at Santa Clara, 2,800 feet, Washington County, Utah. The bird was taken from a dense river bottom thicket along Santa Clara Creek and was in a small flock of Gambel Sparrows (*Zonotrichia leucophrys gambelii*). The specimen collected was the only one identified in the field, although the concentration of the Gambel Sparrows was so great that other Harris Sparrows might easily have been over-looked. The other of us, Higgins, collected a male in central Utah at Price, 5,500 feet, Carbon County, Utah, December 28, 1941. Three Harris Sparrows were seen at the time in a flock of Juncos of the *Junco oreganus* type. These records, scattered over the state and representing several years span, suggest that the Harris Sparrow is a regular winter visitor in small numbers rather than accidental as Woodbury (*op. cit.*) has stated.

To our knowledge, there are only five formal records of the Slate-colored Junco for Utah based on birds handled, not on field observations alone. Of the latter type of record there are a few others not cited here. H. W. Henshaw (Report Geog. and Geol. Expl. and Surv. West 100th Mer. by George M. Wheeler, 5, 1875:266) first reported a specimen taken at Iron Springs, Iron County, Utah, on October 4,

1872. C. L. Hayward (*Wilson Bull.*, 47, 1935:281) refers to a specimen taken by him November 12, 1932, at Provo, Utah County, Utah. Presnall (*Proc. Utah Acad. Sci.*, 12, 1935:209) mentions banding several winter-taken Slate-colored Juncos in Zion National Park. Stanford (*Ibid.*, 15, 1938:145) cites a female collected October 9, 1937, at North Ogden, in Summit County, Utah. Behle (*Wilson Bull.*, 53, 1941:184) recorded a specimen that was collected 5 miles northeast of La Sal post office, 8,000 feet, San Juan County, Utah, April 7, 1938. Incidentally, the allied race, *J. h. cismontanus* was collected at the same general locality about the same time, so there is some doubt as to the sub-species of certain of the other records mentioned.

As to the new data, Behle, together with John Vasquez, collected a male at Santa Clara, 2,800 feet, Washington County, Utah, December 17, 1939. It was in a flock of Oregon Juncos, samples of which proved to be *J. o. montanus*. Higgins collected a male 3 miles east of Price, 5,500 feet, Carbon County, Utah, December 28, 1940. It, too, was in a small flock of Oregon Juncos. In addition, there is a specimen in the University of Utah collection, the data of which have not been published. It is a male collected by A. M. Woodbury at the junction of Smith-Morehouse Creek and the Weber River, Summit County, Utah, October 10, 1931.

These several records together with the fact that the bird has been reported for several years on the Audubon Society Christmas census for Salt Lake City indicate that this bird likewise is an uncommon winter visitant in Utah.—William H. Behle and Harold Higgins, *Department of Biology, University of Utah, Salt Lake City, Utah.*

EDITORIAL

The frontispiece of this volume introduces to our members the Bat Falcon (*Falco albigularis*), never before adequately figured by an artist familiar with the living bird. The beautiful picture reproduced here is one of the prizes brought back by George Miksch Sutton from the first of his series of expeditions to eastern Mexico.

The Bat Falcon is a conspicuous, widespread species, ranging from Argentina to northern Mexico but because its range falls a few miles short of reaching the borders of the United States, it has been largely neglected by American bird students. However, it is different with those who have watched this handsome hawk racing after the crepuscular bats that circle the Sacred Cenote of Chichen-Itza or have admired it in the hot midday sun darting after swift dragon-flies from the gaunt stubs of the drowned forests of Gatun Lake—to them it is one of the very finest of the whole falcon tribe.

Through the generosity of one of our loyal members the publication of this plate is financed without drawing on either the regular funds of the Club or the special illustrations fund begun by our auction at the Urbana meeting.

The unprecedented growth of our membership list last year reduced the reserve stock of the March, 1941 *Wilson Bulletin* to a rather low point. We therefore solicit the return of extra copies or copies not intended for permanent preservation.

Ornithological News

David E. Davis has gone to Rio de Janeiro for the Rockefeller Foundation to spend a couple of years studying the role of birds as vectors of yellow fever.

F. W. Haecker has been appointed the new editor of *The Nebraska Bird Review*.

The Oologist, one of the oldest American bird journals, announces that it will cease publication with the December, 1941, issue. It was founded in 1884 as *The Young Oologist* and has published 58 volumes. Those wishing to secure back volumes or separate numbers should write promptly to the editor, R. M. Barnes, at Lacon, Illinois.

OBITUARY

Glover M. Allen, mammalogist and ornithologist, died in Cambridge, Massachusetts on February 14, 1942. Although his professional position was that of Curator of Mammals of the Museum of Comparative Zoology, he was one of the most erudite of ornithologists. He was the author of "Birds and Their Attributes," "Birds of Liberia," three books on New England birds, and many important shorter papers. Since January, 1937 he had carried on the high editorial tradition of the *Auk*.

Parish S. Lovejoy, of the Michigan Department of Conservation, died in Ann Arbor, Michigan on January 20, 1942. He was not an ornithologist but he had helped and influenced ornithologists and other zoologists to an extraordinary extent. His fluency with tongue and pen and his brilliant critical ability made him a powerful force for straight thinking, thorough work, and clear writing among workers in our field.

Joseph H. Riley, Associate Curator of Birds of the U. S. National Museum, died December 17, 1941. He had published very extensively for forty years on the taxonomy of birds, especially those of the West Indies and of the East Indies and southeastern Asia.

WILDLIFE CONSERVATION

Present Status of the Ivory-billed Woodpecker

The Ivory-billed Woodpecker has been very close to extinction for the past twenty years. The remaining individuals and their immediate forebears, although very few and gradually dwindling in numbers, have been able to persist so long because of the continued survival of a few primeval forests where there are enough old and dying trees to supply food to the woodpeckers. In 1939, at the close of the National Audubon Society's research project on the Ivory-billed Woodpecker, the estimated total population of the species was only about twenty-four individuals. These were scattered among remnants of virgin forest in Florida and in Louisiana, not more than six or eight birds being in any one locality. The next few years may decide the fate of the Ivory-bill. The smallness of the nation's reserves of swamp timber, the rising value of lumber, and the present need for many kinds of raw materials may bring destruction to its habitat and thus end the species.

There are now only three places which appear to offer any chance for the survival of Ivory-bills. In only one of these—the Singer Tract—are Ivory-bills known certainly to occur, although there is reason to believe that there are a few individuals in the other two. Further, the Singer Tract is now in the process of being destroyed.

The Singer Tract, by all odds the most important remaining Ivory-bill habitat, is an area of virgin timber in northeastern Louisiana, a forest remarkable for its richness of plant and animal life. Ivory-bills have inhabited it for many years; they have been studied and observed there more than in any other place; and more of the birds are there than in any other known habitat. In recent years there have been from six to eight Ivory-bills living in what was left of the virgin timber.

Within the last three or four years a large lumber company acquired control of the tract and began logging the forest. Up to last year most of the cutting was done in parts of the tract not inhabited by Ivory-bills; however, the territory of one pair was logged over, after which the pair disappeared. Last summer logging was started in another part of the forest inhabited by Ivory-bills; it was interrupted by winter rains before so much damage was done as to drive the birds away, but the work will be continued when conditions permit. There is little doubt but that complete logging of the tract will cause the end of the Ivory-bills there, and since the surrounding country is young second-growth forest and cultivated lands, it will doom the woodpeckers to a vain search for suitable food and habitat.

Discussions are being carried on with officials of the company controlling the tract to determine what might be done for the Ivory-billed Woodpecker. Present conditions make it unlikely that much can be done now, but one of the best parts of the tract, from the viewpoint of conservation, will probably be the last to be logged, and the condition of the nation may change enough and in time to allow the saving of that part.

The only two other areas where Ivory-billed Woodpeckers may be conserved are both in Florida. One is in the bottomlands of the Apalachicola River and the other is the Big Cypress region of southern Florida. Nothing is positively known about the presence of Ivory-bills in these, but the evidence indicates that a few of the birds inhabit both localities. There should be increased interest in these two regions because they are both wilderness areas and unusual habitats for wildlife. Of the two, the Big Cypress is the least likely to be changed by logging or any other activity and so the most likely to be the place where Ivory-bills will survive. It is one of the few remaining primitive areas in eastern United States

and probably will remain so for some time. For that very reason immediate efforts should be made for its preservation, for they will have a better chance of succeeding if carried out before rising prices for timber and other resources make the region profitable to commercial interests.

The future of the Ivory-billed Woodpecker is far from bright, but there is still a chance for its survival if we can plan well enough ahead.—James T. Tanner.

Conservation Notes from Canada

Although bird lovers and ornithologists usually appreciate birds, bird sanctuaries, and bird conservation for good reasons other than the strictly economic, it is undeniable that in advancing conservation work, particularly in obtaining the support of that large part of the population that, without special stimulation, realizes no interest in such activities, sound economic arguments are very useful.

The well-known Canadian Bird Sanctuary at Bonaventure Island and Percé Rock, at the east end of the Gaspé Peninsula, established by both the Dominion Government and the Province of Quebec, consists chiefly of rocky cliffs inhabited by Gannets, Atlantic Murres, Razor-billed Auks, Double-crested Cormorants, Herring Gulls, and other non-game birds, yet annually justifies itself as a valuable

A section of the Gannet colony in Bonaventure Island Bird Sanctuary, Quebec. This photograph, taken in May, 1940, by the Canadian National Parks Service, shows how increase of these birds under protection is causing them to invade the pasture above the cliff.

economic asset because of its attraction for tourists. During 1941 Percé was visited by about 20,000 tourists, of whom about 14,000 circumnavigated Bonaventure Island in local motorboats. Local income derived from this tourist traffic was in the neighborhood of $120,000. Fortunately the birds in this sanctuary, though easily observed, are so protected by the cliffs from close contact with the public that unlimited numbers of well-comported visitors can enjoy them without causing harmful disturbance.

Canadian regulations under The Migratory Birds Convention Act prohibit hunting migratory game birds on baited areas or by the use or aid of baiting. In some places there developed a practice of having grain placed in the water (which is not unlawful) by landowners or those acting for them, with subsequent hunting of ducks by other persons, who, when prosecuted, claimed entire ignorance of the presence of the grain. The Royal Canadian Mounted Police are meeting this practice by searching for grain in suspected places and, if any is found, posting the area for the rest of the season with official signs that read as follows: "Warning. Baiting with grain has been done in this vicinity. Hunting of wild ducks, wild geese, or other migratory game birds on this area or of any such birds attracted to the vicinity by such baiting is unlawful. Unauthorized removal, damaging, or destruction of this sign is prohibited. Penalties, $10 to $300 fine, or imprisonment up to six months, or both fine and imprisonment under the Migratory Birds Convention Act. National Parks Bureau." This method is proving very effective.—Harrison F. Lewis.

Prairie Grouse

"There is some doubt as to the fate of the sharp-tailed grouse and prairie chicken in northern North Dakota. Recently introduced soil conservation practices have done much to improve cover, but the tolerance of these native grouse to the rapidly increasing pheasant and Hungarian partridge populations in this area is yet to be determined. During the hunting season all three birds are frequently flushed from the same aspen-rimmed pot-holes at one time. Whether this close association can successfully exist during the nesting season is a question." (*Wildlife News*, October 15, 1941: 10)

In comparison with other game birds, Prairie Chickens and Sharptails have been given rather little study in the past. Since Pittman-Robertson money has become available, however, there has been a marked increase in the number of states in which research on one or both is under way. The list now includes: Wisconsin, Michigan, Minnesota, Missouri, Illinois, Indiana, Oklahoma, Texas, Nebraska, Kansas, North Dakota, Montana, Colorado, and Utah. Small refuges (but without accompanying research) have recently been purchased by Iowa, Idaho, and New Mexico.

One race of Prairie Chickens—the Heath Hen—has become extinct; the Attwater Prairie Chicken is now limited to about ten per cent of its former range and is in critical condition numerically; the Greater Prairie Chicken has lost most of the southern part of its original range, and has been displaced to the north. The Lesser Prairie Chicken occurs now in only about half of its original range. Sharp-tails have fared considerably better, but show an even more complete loss of the southern part of their range. One race, the Columbian Sharp-tail, is threatened with extinction.

Both Prairie Chickens and Sharp-tails, then, have suffered great loss of range; both have nearly disappeared from the southern parts of their original ranges, and have been displaced to the north; each is now tremendously reduced in numbers. In each case, the most obvious cause of the decline has been the destruction of habitat. Over-hunting has also contributed. Habitat destruction on the original

range was accomplished by agricultural development; the removal of agriculture and subsequent brush invasion have now taken away much of the acquired range to the north. Forest plantings have further reduced the northern range, particularly in the Lake States (see "Timber vs. Wildlife," L. A. Davenport, *Jour. of Forestry*, 39, 1941: 661–666), and improved fire protection is hastening the loss of still more.

It is well that the prairie grouse are now being studied on a wider front. Their general requirements are by no means understood as yet, and no one state contains a complete cross-section of the specific problems involved. Pheasant competition, perhaps of major importance in the North Central States, is ne problem in the South; over-grazing, so important in the South and West, cuts a minor figure in the Lake States; forest plantations and brush invasion are of more critical importance in the Lake States than elsewhere.—F.N.H.

Trumpeter Swans: a Correction

In the last issue of the *Bulletin*, Trumpeter Swan population figures for the last eight years were quoted from *Wildlife News*. Those figures refer only to Trumpeter Swan populations in the United States, although the quotation did not so specify. There are thought to be about 500 more Trumpeter Swans in western Canada.—F. N. H.

National Defense and Conservation

In order to protect vital defense secrets and the whereabouts of military installations, the Army has prohibited hunting along many parts of the Pacific coast. It is possible that there will be no open season along the entire coast region.—Leonard Wing.

Albert M. Day has informed us that " . . . the Army has definitely abandoned all plans dealing with the military development at Henry's Lake and West Yellowstone. After the situation as to the possible danger to the Trumpeter Swans was fully presented to them they completely withdrew from the area and took their winter training grounds elsewhere." (Letter, Jan. 20, 1942.)—F.N.H.

Committee Notes

Arthur S. Hawkins has asked to be relieved of his duties as a member of the Conservation Committee because of pressure of his Army duties. He is attached to the Medical Corps at Sheppard Field, Texas.

A new member, John W. Handlan of the West Virginia Conservation Commission, Division of Education, has been appointed to the Committee.—F.N.H.

Wildlife Conservation Committee
Frederick N. Hamerstrom, Jr., Chairman

ORNITHOLOGICAL LITERATURE[1]

THE WHITE-CROWNED SPARROWS (ZONOTRICHIA LEUCOPHRYS) OF THE PACIFIC SEABOARD: ENVIRONMENT AND ANNUAL CYCLE. By Barbara D. Blanchard. University of California Publications in Zoölogy, 46, No. 1: 1–178, 20 plates, 30 figures. Nov. 14, 1941. $2.00.

This is a notable paper, combining in masterly style field observation and laboratory technique, life history study and histological examinations of collected specimens. It is a systematic analysis of the differences in two races of the White-crowned Sparrow which winter together in Berkeley, California, one of them remaining there to nest, the other migrating to Puget Sound in March. Five years were spent in observation at Berkeley and one nesting season, besides one winter visit, at Friday Harbor, Washington; in both localities nesting birds were color-banded.

As to morphological differences, the northern race (*Z.l.pugetensis*) is lighter in color with "lighter weight, perhaps reflecting smaller body size, but not reflected in the dimensions of the appendages" (p. 10). In comparing winter males, 43 *pugetensis* averaged 26.6 grams and 17 *Z.l.nuttalli* 29.1 grams. The pre-nuptial molt is much more extensive in *pugetensis* than in *nuttalli*, so that "first-year Puget Sound sparrows breed in fully adult plumage, whereas first-year Nuttall sparrows breed in wholly or partially immature plumage."

The nesting cycle of the Nuttall Sparrow is divided into four chief periods: the base level (fall and winter); the rising tide of territorial and sexual instincts; reproductive; subsidence (at the time of the molt). The pair stay on their territory throughout the year, tolerating strangers, but in January the male drives out others with song and pursuit. Nesting starts in March or April, the female builds and incubates, the male helps feed; young are cared for until they are 32 to 35 days old. Sometimes three broods are fledged within 6.3 months.

Reproduction is similar with the Puget Sound Sparrow, but less leisurely; young are cared for for only 25–28 days, three broods being attempted in four months.

More than half the volume is devoted to a detailed study of the gonad cycle of the two races. Although these birds are exposed throughout the winter to identical conditions of light, temperature, and other factors, the gonads of the residents reach 5 mm^3 in early January and full size (135 mm^3) in March; while those of the winter residents reach only 4–5 mm^3 (stage 4 or 5) at this date. Dr. Blanchard finds that "temperature is the most important single factor lying at the ultimate source of annual variations of the gonad cycle" (p. 74). She divides the time of increase of the gonads into three periods: I—prior to Dec. 21; II—Dec. 21 to time of attainment of stage 5 (4 to 9 weeks); III—from stage 5 to the first eggs (7 to 8 weeks). There was no correlation with temperature in Period I; high correlation in Period II, but low correlation with precipitation and sunshine; while in Period III correlation with all factors was low. She criticizes the drawing of sweeping conclusions from experiments based on subjecting captive birds to conditions of abnormal lighting. "In fact it seems to me extremely doubtful whether the abundant means which have been discovered for upsetting the physiological balance of captive birds should be accepted as possessing any bearing whatever on the factors which control the cycle under natural conditions" (p. 76).

There is a wealth of valuable material in this volume on territory, relations of mates to each other and their neighbors, flock, and behavior, as well as the physiological and histological research. It is a brilliant piece of work and deserves wide circulation and careful study.—M. M. Nice.

ATTWATER'S PRAIRIE CHICKEN, ITS LIFE HISTORY AND MANAGEMENT. By Valgene W. Lehmann. North American Fauna 57, 1941. v + 65 pp., 14 plates, 4 text figures. $0.40 (paper), of Superintendent of Documents, Washington, D.C.

Within the last 100 years, the range of the Attwater's Prairie Chicken in Texas

[1] For additional reviews see pages 16 and 24.

has been reduced more than 93 per cent, their numbers an estimated 99 per cent. The process was about as follows: "Development of the coastal territory, as farming, grazing, and the exploiting of oil, crowded prairie chickens into ever smaller areas, where they were more easily found and killed [by hunters]." (p. 44).

Lehmann has done his best work in evaluating the influences of, and devising remedies for, the environmental factors which depress Prairie Chicken populations. The straight life-history material does not quite measure up to this standard of excellence. He has described courtship and mating, nesting; growth, development, and mortality of young; brood size and disintegration; flocking and seasonal movements; and foods. Some of this—nesting and food habits—seems plainly to be based on too little data; at other points—as brooding of young, movements—one cannot be sure of the extent of the supporting data. "Annual increase" is discussed, but is not related to replacement of annual losses. More use might have been made of the literature on the other subspecies, and on closely related species.

These are minor criticisms and would not apply were this not, presumably, a completed study.

The discussion of environmental relationships is packed with sound life-history and ecological material (perhaps there is a parallel here with the best of "functional" architecture). One section is devoted to habitat requirements: "Optimum prairie chicken range apparently consists of well-drained grassland, with some weeds or shrubs, the cover varying in density from light to heavy; and with surface water available in summer; diversification within the grassland type is essential." (ii.) Another treats of limiting factors, both natural (rainfall, drought, spread of woody vegetation, predation, etc.) and artificial (agriculture, burning, over-grazing, hunting, etc.). One of the most important of the natural limiting factors is rainfall in May: while rain cannot be regulated by man, he can take account of it in setting the times and places of hunting seasons. In the main, the man-made limiting factors have done far more damage than the natural.

The final section, on management, shows what environmental manipulations are needed and in what seasons they are effective. These recommendations, wisely, are of two orders of intensity: a set of procedures for those interested in moderate improvement of the habitat, and another for those who wish to go still farther. He has made it plain that the welfare of Prairie Chickens depends on the landowner, and further believes that large Federal or State refuges are absolutely essential.

The current catch-word "too little and too late" could fairly be applied to the attempts to save the Heath Hen. Because of a host of conflicting interests, too little was ever done; when really serious work was begun, it was begun too late. It remains to be seen whether the Attwater's Prairie Chicken, sometimes called the Heath Hen of the South, will fare better. Lehmann's work is a major step in the development of methods, and a timely one.—F. N. Hamerstrom, Jr.

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PROCEEDINGS OF THE TWENTY-SEVENTH ANNUAL MEETING

BY OLIN SEWALL PETTINGILL, JR., SECRETARY

The Twenty-seventh Annual Meeting of the Wilson Ornithological Club was held November 20–23, 1941, on the campus of the University of Illinois at the invitation of the Department of Zoology, Illinois State Natural History Survey, Natural History Museum, Urbana-Champaign Bird Club, Animal Ecology Club, and the Wildlife Club. Headquarters, one session, and dining quarters were in the attractive new Illini Union Building; the remaining sessions were in Gregory Hall.

The Executive Council met on Thursday evening. Friday and Saturday were devoted to two short business sessions, three sessions of papers, one session of natural color slides and motion pictures, a symposium, a show of natural color motion pictures, two open houses, a meeting of the Membership Committee, an auction of paintings, and the Annual Dinner. On Sunday there was a field trip to the Lake Chautauqua Wildlife Refuge.

Meeting of the Executive Council

Dr. Josselyn Van Tyne was unanimously reappointed Editor of *The Wilson Bulletin*.

The Council accepted the invitation of Cornell University and the Cornell Laboratory of Ornithology to hold its 1942 Annual Meeting at Ithaca, New York. The meeting will take place on Friday and Saturday, November 27 and 28.

After some discussion as to possible meeting places in 1943, St. Louis, Missouri, was tentatively decided upon.

At the suggestion of the Treasurer, who has customarily served as Chairman of the Endowment Fund Committee, the Council authorized the organization of a new Endowment Fund Committee with a person other than the Treasurer as chairman and with committee members representing various sections of the country. It was the opinion of both the Treasurer and the Council that such a chairman would have more time in which to direct the affairs of this committee.

The Council reviewed the two amendments to the Constitution which were proposed at its meeting in 1941 (see *Wilson Bulletin*, 53: 59) and which were now on the table awaiting the action of Club members at the Saturday afternoon Business Session. It recommended the adoption of the first amendment to Article II, Section 3. This amendment reads: The dues of all associate members shall be raised from one dollar and fifty cents ($1.50) to two dollars ($2.00); the dues of all active members from two dollars and fifty cents ($2.50) to three dollars ($3.00).

Affiliations with the Inland Bird-Banding Association, the Virginia Society of Ornithology, and the Georgia Ornithological Society were approved by the Council.

In order to coordinate further the work of the various standing committees and the officers, the Council ruled that the chairmen of all standing committees shall be invited to participate in future Council meetings in an advisory capacity.

The need for revision and subsequent publication of the Constitution and By-Laws was expressed by the Secretary.

Business Sessions

President Lawrence E. Hicks called to order the first business session on Friday morning at 9:45. The minutes of the previous meeting were approved without being read since they had already been published in *The Wilson Bulletin*. The reports of the Secretary, Treasurer, Editor, and Librarian were read and approved.

The President appointed the following three temporary committees:

Resolutions: L. H. Walkinshaw, Frank Bellrose, Jr., and F. N. Hamerstrom, Jr.

Auditing: R. M. Strong and Burt L. Monroe.

Nominating: Margaret M. Nice, Harry W. Hann, and Richard L. Weaver.

A list of persons nominated to membership during the current year was placed on the table for approval by the organization.

The reports of the following committees were read and approved: Program, Endowment Fund, Membership, Wildlife Conservation, Affiliated Societies, Index, Library, and Illustrations.

The second and final business session was called to order at 2:15 Saturday afternoon by Vice-President Sutton.

Persons nominated to membership during the current year were formally elected.

The two amendments to Article II, Section 3, of the Constitution which were proposed by the Council at the Twenty-sixth Annual Meeting at Minneapolis were voted upon. The first amendment, bearing the Council's recommendation, was accepted unanimously. The second amendment was rejected.

The Resolutions Committee presented the following resolutions which were then adopted:

Whereas, the Sandhill Crane is becoming an increasingly rare breeder in the North Central States, and *Whereas,* Bernard W. Baker of Marne, Michigan, has purchased 491 acres of marsh in Calhoun County, Michigan, for the establishment of a Sandhill Crane Sanctuary, be it *Resolved,* that the Wilson Ornithological Club extend a vote of appreciation to Bernard W. Baker, one of its members, for establishing such a sanctuary.

Whereas, the White-winged Dove in the Rio Grande valley in Texas is rapidly decreasing in numbers due to the accelerated appropriation of its habitat by the clearing of lands essential to its perpetuation; and *Whereas,* the Fish and Wildlife Service and the Texas Game, Fish, and Oyster Commission have recognized the precarious situation of the bird and have conducted research for the purpose of determining measures which might be taken to preserve it, and have reached rather definite conclusions indicating that its preservation is dependent on the purchase and protection of specific nesting grounds, and on other measures; now therefore be it *Resolved,* that the Wilson Ornithological Club urge the Fish and Wildlife Service and the Texas Game, Fish, and Oyster Commission to take the necessary steps at the earliest possible time to insure the perpetuation of this species; and be it further *Resolved,* that copies of this resolution be sent to the Director of the Fish and Wildlife Service and the Texas Game, Fish, and Oyster Commission.

Resolved, that the Wilson Ornithological Club join with the National Audubon Society and other conservation organizations in advocating uniform state laws conforming to the terms of the new New York State law, carrying into effect the conditions of the Joint Declaration of Policy and Program entered into by the National Audubon Society and Feather Industries of America, Inc. Be it further *Resolved,* that the Wilson Ornithological Club join with the National Audubon Society and other conservation organizations in advocating an amendment of the Federal Tariff Act to eliminate the proviso which now permits importation of wild bird plumage for use in the manufacture of fish flies and the importation of manufactured fish flies containing wild bird plumage.

Resolved, that the Wilson Ornithological Club at its Twenty-seventh Annual Meeting on November 20-23, 1941, in Urbana-Champaign, Illinois, express its sincere thanks to its hosts who have made this meeting so pleasant and successful and to the University of Illinois, especially to the members of the Local Committee and its Chairman, S. Charles Kendeigh, to the Department of Zoology, Illinois Natural History Survey, Natural History Museum, Urbana-Champaign Bird Club, Animal Ecology Club, and the Wildlife Club.

The Nominating Committee offered the following report:

President—George Miksch Sutton, Laboratory of Ornithology, Cornell University, Ithaca, New York.

First Vice-President—S. Charles Kendeigh, University of Illinois, Champaign, Illinois.

Second Vice-President—Olin Sewall Pettingill, Jr., Carleton College, Northfield, Minnesota.

Secretary—Maurice Brooks, West Virginia University, Morgantown, West Virginia.

Treasurer—Gustav Swanson, University Farm, St. Paul, Minnesota.

Additional Members of the Executive Council—Eugene P. Odum, University of Georgia, Athens, Georgia; Burt L. Monroe, Anchorage, Kentucky; Lawrence H. Walkinshaw, Battle Creek, Michigan.

The report of the Nominating Committee was accepted by motion and the Secretary was authorized to cast one ballot for the nominees, thus electing them officers of the Wilson Ornithological Club for the ensuing year.

The session was formally adjourned at 4:00 P.M.

Papers Sessions

The opening session began on Friday morning with an address of welcome by Dr. Carl G. Hartman, Head of the Department of Zoology and Physiology, and a response by President Lawrence E. Hicks.

The remainder of the Friday morning session, the Saturday morning session, and a portion of the Saturday afternoon session were devoted to the reading of papers. There were altogether 19 papers devoted to the following ornithological studies: life history, 5; distribution, 5; historical, 3; population, 3; wildlife management, 1; bird sounds, 1; taxonomic, 1.

Below is given the program of papers, together with brief abstracts:

Opening Session, Friday Morning, November 21

1. Harry W. Hann, University of Michigan. *The Cowbird at the Nest.* Illustrated by 3¼" x 4" slides. (20 minutes.)

(Abstract omitted because this paper was published in the last December issue of *The Wilson Bulletin.*)

2. Maurice Brooks, West Virginia University. *Birds at the Extremities of Their Ranges.* (12 minutes.)

(This paper is being published in *The Wilson Bulletin.*)

3. Ferd Luthy, Duck Island Preserve, Peoria, Illinois. *"Report of the Superintendent."* (10 minutes.)

Interesting excerpts from an unsigned typewritten manuscript entitled: "Superintendent's Second Annual Report to the Duck Island Club." The report was dated January 19, 1897. The Club, established in 1886, was located five miles from Lake Chautauqua.

The above report described the marsh conditions, summarized the number of hunting days and resultant kill, mentioned the "crippling" loss and the necessity (?) for artificial feeding and a bag limit of 25 "within a few years."

4. C. W. G. Eifrig, Concordia Teachers College, River Forest, Illinois. *Illinois Ornithology at Seventy and Ninety Years Ago.* (15 minutes.)

About 1870-72 the late E. W. Nelson carried on extensive ornithological research in northeastern Illinois, mainly in the vicinity of Chicago. He published his results in *The Bulletin of the Essex Institute* in 1876. In this paper the great changes in bird life between then and now were pointed out.

5. George Miksch Sutton, Laboratory of Ornithology, Cornell University. *Is Sutton's Warbler a Valid Species?* (15 minutes.)

(This paper has now been published in the *Cardinal,* 5, No. 7, Jan., 1942: 151–154, 2 pls.)

6. Pierce Brodkorb, University of Michigan Museum of Zoology. *Life Zones versus Biotic Areas in Chiapas, Mexico.* (15 minutes.)

The avifauna of Chiapas is divisible into major altitudinal groups, each of which has two or more isolated subdivisions. The break between life zones and biotic areas occurs at different places for different species. The degree of endemism in each area is inversely correlated with increasing altitude. Time rather than physical isolation appears to be the primary factor controlling speciation in this region.

Saturday Morning

7. Dorothea W. F. Ewers, Department of Psychology, University of Chicago. *The Calls of Song Sparrows, Bobolinks, and Goldfinches Raised in Captivity.* Illustrated with disc recordings. (20 minutes.)

A comparison of the calls of the following birds: two male Song Sparrows raised by Mrs. Margaret M. Nice; two male Bobolinks raised by O. S. Pettingill, Jr.; and a male and female Goldfinch raised by William E. Schantz.

8. Katherine A. White, University of Michigan Biological Station. *Frequency of Occurrence of Summer Birds in the Immediate Vicinity of the University of Michigan Biological Station.* Illustrated by 3¼″ x 4″ slides. (15 minutes.)

A study of the composition of the bird population in the vicinity of the University of Michigan Biological Station during the summer of 1941 using Jean M. Linsdale's method of applying Raunkaier's Law of Frequence.

9. B. W. Cartwright, Ducks Unlimited, Winnipeg, Manitoba, Canada. *Birds Observed in the Perry River District, Queen Maud Gulf, Canadian Arctic, by Angus Gavin.* Illustrated by 2″ x 2″ slides. (20 minutes.)

Circumstances leading up to the discovery of the breeding grounds of Ross's Geese (announced in 1940) and the discovery of the breeding grounds of Tule Geese in 1941, with further detailed observations made in 1941 on Ross's Geese and a brief account of the bird life of the hitherto unexplored Perry River country.

10. Leonard C. Brecher, Louisville, Kentucky. *Early Ornithologists and Their Books.* Illustrated with 2″ x 2″ Kodachrome slides. (20 minutes.)

Since there has been no simple published account of the works of the men who have influenced North American Ornithology, this paper presented a survey of the men and their chief works in their historic sequence. For illustrative purposes three slides of an original chart were projected on the screen. This chart had been compiled to show the relationship of one man's life span to another and to give the dates of each man's publications. The "period system" advanced by Elliott Coues was extended back to Aristotle and continued to the present.

11. J. Frank Cassel, Laboratory of Ornithology, Cornell University. *An Inland Island—A Preliminary Discussion of the Ornithological Significance of the Black Hills of South Dakota and Wyoming.* Illustrated with 3¼″ x 4″ slides. (15 minutes.)

In southwestern South Dakota and extreme northeastern Wyoming, rising from two to three thousand feet above the surrounding plains, lies an area of approximately 50 by 100 miles known as the Black Hills. The Biological Survey's life zone map (1910) indicates this region as a spot of Canadian in the southern extremity of an arm of Transition Zone. Pitelka (1941) in his map of the major biotic communities of North America shows it as an island of coniferous forest amid a sea of extensive grassland.

In spite of the facts of this interesting isolation of the Black Hills, and of their being the home of at least one endemic species—the White-winged Junco, and

of their lying on the periphery of the range of 107 of the 189 birds listed as breeding, little concentrated ornithological work seems to have been done in the region. The purpose of this paper was twofold: first, to call the attention of bird students to a unique territory; and second, to inquire after the unpublished data of any who have worked there.

12. O. Ruth Spencer, University of Michigan Biological Station. *Studies in the Life History of the Black-billed Cuckoo.* (15 minutes.)

A discussion of the observations made at the University of Michigan Biological Station during the summers of 1939 and 1941. Information was obtained on such phases of the Cuckoo's life history as egg-laying intervals, length of incubation period, length of nestling life, feeding habits, and frequency of feeding the young.

13. Robert C. McClanahan, U. S. Fish and Wildlife Service, Washington, D.C. *Waterfowl Investigations in the Prairie Provinces of Canada, 1940–1941.* Illustrated by 3¼" x 4" slides. (15 minutes.)

Continuing investigations begun by the Fish and Wildlife Service in 1934 on the waterfowl nesting areas of Manitoba, Saskatchewan, and Alberta, the months of June, July, and August of 1940 and 1941 were spent on the prairies of southern Canada. As a result of subnormal precipitation only a relatively small number of sloughs were available as nesting sites, yet by far the most important factor limiting increase was a breeding stock insufficient to occupy the available water. In 1940 there was no indication of any serious loss of ducklings from lack of water, and in 1941 the loss was not much greater. Mortality from several other adverse factors was noted, but in neither year was this considered excessive. Whereas a slight increase of waterfowl was predicted in 1940, practically no changes in the numbers of waterfowl sent south from the prairies were predicted in 1941.

14. Verna R. Johnston, University of Illinois. *Factors Influencing the Distribution of Woodland Birds in Winter.* Illustrated by 3¼" x 4" slides.

This study of a second-growth Illinois forest covered one and one-half years. Wind and temperature had varying effects upon the distribution of the birds in winter: a strong wind caused day by day shifts in location; temperature influenced the amount of feeding and vertical distribution. Winter flocking tendencies were analyzed and the composition of an average flock determined.

15. Margaret M. Nice, Chicago, Illinois. *Song in Female Birds.* Illustrated by 3¼" x 4" slides. (15 minutes.)

Singing in birds is usually thought of as a male prerogative. In some species, however, females regularly sing, while in others they do so sporadically. A theory of the possible evolution of song in male and female birds was suggested. Song is innate in both sexes. Where song serves chiefly territorial uses and territorial defense is primarily taken over by one sex; then song is most highly developed in this sex, and may almost disappear in the other. In individual cases where territorial responsibilities are thrust upon the normally less active bird, it may respond with excellent song (e.g., Blanchard's female White-crowned Sparrows). Where song serves as a bond between the sexes, it naturally is well developed in both.

16. Richard Lee Weaver, Dartmouth College, Hanover, New Hampshire. *Notes on the Life History of the Pine Siskin.* (15 minutes.)

A summary was given of thirty days of observation on the building of the nest, laying of the eggs, incubation, and raising of the young of a pair of Pine Siskins at Hanover, New Hampshire during April and May, 1941. There were also general observations on the Siskin populations of 1941 compared with Siskin populations of other years and with those of other northern finches.

SATURDAY AFTERNOON

17. ROBERT E. HESSELSCHWERDT, Illinois State Natural History Survey. *Wildlife Restoration Experiments on Intensively Farmed Land in Champaign County, Illinois.* Illustrated by 3¼" x 4" slides. (15 minutes.)

The work described in this paper is concerned with the problem of establishing good wildlife restoration methods on the very intensively farmed land in the black soil prairie region where corn and soy beans are the most important crops.

The factors most influential in this region are: (1) soil of superior fertility linked with (2) a class of farming people superior in education, wealth, and aggressiveness.

Because of the universal use of modern farming machinery, including mechanical corn pickers, there is a large food supply in the form of waste grains for upland game and other wildlife species. This food supply is not being utilized because it is not balanced by adequate protective cover. The situation is being met by the establishment of 3½ miles of fence-row plantings on the 4-square-mile development area, utilizing shrubs and evergreens which conform with the special requirements of the region.

Fifty-six large nest boxes built at a total cost of approximately $98 and installed in trees and hedges on the study area, have produced in two years a total of 32 young Screech Owls, 19 young Sparrow Hawks, 37 young fox squirrels, 200 pounds of wild honey, and good winter shelter for many wildlife species. These boxes have also produced much information on the nesting habits and food habits of the Screech Owl.

18. FRANK BELLROSE, JR., Illinois State Natural History Survey. *Waterfowl Populations in the Illinois River Valley.* Illustrated with 3¼" x 4" slides. (15 minutes.)

Population estimates of waterfowl on representative lakes in the Illinois River valley have been made since 1938. Graphs, based on the number of birds per acre of water surface, showed the relative abundance of the more important species of waterfowl.

Various factors affect the seasonal and annual abundance of waterfowl in the Illinois Valley. Water and food supply are the two most important factors.

19. GEORGE MIKSCH SUTTON, Laboratory of Ornithology, Cornell University, and OLIN SEWALL PETTINGILL, JR., Carleton College and the University of Michigan Biological Station. *The Birds of a Bull's Horn Acacia.* (15 minutes.)

A common shrub of Mexico is the Bull's Horn Acacia which possesses large paired thorns in which live a species of red-and-black ant. On the Rancho Rinconada in southwestern Tamaulipas, headquarters of the Cornell University-Carleton College Expedition, grew one such shrub in which nested a pair of Derby Flycatchers (*Pitangus sulphuratus*) and a pair of Giraud's or Social Flycatchers (*Myiozetetes similis texensis*). In a blind set up by this shrub for observation purposes a female Hooded Oriole (*Icterus cucullatus cucullatus*) built her nest.

During a period of 25 days considerable information was obtained on the life histories of these individual birds and the ecological relationships of birds, ants, and shrub.

NATURAL COLOR SLIDES AND MOTION PICTURES SESSION
SATURDAY AFTERNOON

20. EDWARD MORRIS BRIGHAM, JR., Kingman Memorial Museum, Battle Creek, Michigan. *Some Unusual Experiences with Michigan Birds.* Kodachrome slides and 16" x 20" black and white enlargements. (20 minutes.)

A popular account of Bald Eagles nesting on the ground in jackpine country,

photographing Hudsonian Curlews and Kirtland's Warblers, a male Bob-white incubating a clutch of eggs from early July to early October, and visits to a Black-crowned Night Heron and Common Tern colony.

21. Lawrence H. Walkinshaw, Battle Creek, Michigan. *Some Sandhill Cranes in Native Habitats.* Kodachrome motion pictures. (15 minutes.)

Views of cranes and crane habitats in Michigan, the Kissimmee Prairie of Florida, Jackson County in Mississippi, Malheur National Wildlife Refuge in Oregon, Caribou County in Idaho, and Juab County in Utah.

22. Rosalie Edge, Emergency Conservation Committee and Hawk Mountain Sanctuary Association, New York City. *Hawk Mountain Comes to the W.O.C.* Kodachrome motion pictures. (Because Mrs. Edge was unable to attend the meeting, the pictures were presented by Roger Tory Peterson.)

A pictorial record of a typical October day at Hawk Mountain, Pennsylvania, showing the numbers of visitors and the numbers of hawks and eagles seen from the crest of the mountain.

A Symposium on the Distribution of Birds in Relation to Ecological Concepts

On Friday afternoon from 2:00 to 4:00 a symposium was held on the biome concept in bird distribution in contrast to the life-zone concept. The symposium was led by Dr. V. E. Shelford of the University of Illinois.

Eugene P. Odum, University of Georgia. *Relation of the Distribution of Birds to Biomes.*

John W. Aldrich, Fish and Wildlife Service, Washington, D.C. *Birds of a Deciduous Forest Aquatic Association.*

Joseph J. Hickey, New York City. *Deciduous Forest Birds.* (Paper presented by S. Charles Kendeigh.)

O. A. Stevens, North Dakota State Agricultural College. *Grassland Birds.*

Roger Tory Peterson, National Audubon Society, New York City. *Coniferous Forest Birds.*

Following the above presentations the Chairman led an interesting discussion in which ten persons participated.

A Show of Natural Color Motion Pictures

During Friday evening three members presented some of their latest motion pictures as follows:

The Bobolink and the Blue Jay. Olin Sewall Pettingill, Jr., Carleton College and University of Michigan Biological Station.

Bird Life of the Miami Valley. Karl H. Maslowski, Cincinnati, Ohio.

Wings of the West. Cleveland P. Grant, Baker-Hunt Foundation, Covington, Kentucky.

Through the courtesy of the U.S. Fish and Wildlife Service, W. F. Kubichek's film on the home life of the Western Grebe was shown at the conclusion of the show.

Open Houses

The Vivarium Building was open to visitors between 4:00 and 6:00 on Friday afternoon and guides were available from the Animal Ecology Club. Researches in progress dealing with photoperiodism, metabolism, continuous record of activity, and bird parasites were on exhibit. The Natural Resources Building was open to visitors from 6:00 to 8:00 on Friday evening. Guides from the Wildlife Club were available to show the work in progress dealing with birds, mammals, fish and wildlife management.

The Natural History Museum on the second floor of the Natural History Building was open for inspection throughout the meeting. Here were exhibits of all common Illinois birds as well as representatives of other major animal groups.

Meeting of the Membership Committee

A special meeting of the Membership Committee was called to order on Friday afternoon by its Chairman, Dr. Richard L. Weaver. Twelve members and the Secretary were present. This meeting gave excellent opportunity for the members of this important committee to pool their suggestions for increasing the effectiveness of their work. The progress of the past year was reviewed and plans for the coming year were formulated.

An Auction of George Miksch Sutton's Original Paintings

Following the sessions of Saturday afternoon, the members and visitors adjourned to the nearby Y.M.C.A. Building to participate in an auction of Sutton originals (six small-sized watercolor paintings and one pencil drawing). Mr. James Boswell Young of Louisville, Kentucky, served as auctioneer. The irresistible humor and entreaties of the auctioneer made the occasion highly enjoyable and successful. As had been previously announced, the entire sum of money obtained from this auction will be used in financing illustrations for *The Wilson Bulletin*.

The Annual Dinner

The Annual Dinner in the Illini Union Building on Saturday evening had the largest attendance in the history of the Wilson Ornithological Club—altogether 174 persons were present.

An attractive pen-and-ink sketch of a Wilson's Plover by T. M. Shortt of Toronto, Canada, decorated the menu and small, original sketches by the same fine artist enlivened the place-cards at the speakers' table.

Following the dinner Dr. Theodore H. Frison, Chief of the Illinois State Natural History Survey, spoke on the present wildlife management program of the Survey with particular reference to ornithological activities and showed a Survey film, "Nest Boxes for Wildlife Restoration, with Special Reference to the Wood Duck." Then Murl Deusing, Naturalist and Lecturer of the Milwaukee Public Museum, showed his natural color film, "Wild Wings," containing numerous episodes in the life histories of the Great Blue Heron, Blue-winged Teal, Mourning Dove, Woodcock, American Bittern, Barn Swallow, Ruby-throated Hummingbird, Rose-breasted Grosbeak, and Herrings Gulls.

Field Trip

On Sunday about seventy members and visitors went on a field trip to the Lake Chautauqua Wildlife Refuge on the Illinois River near Havana. The trip was sponsored by the Illinois State Natural History Survey. A journey around the Refuge was made in the Survey's boat. Approximately 150,000 ducks, mostly Mallards, were seen.

Attendance

According to the registration books 241 persons attended the meeting, but this figure does not include the large number of visitors attending the show of motion pictures on Friday evening.

One hundred and thirty-four of the persons in attendance were members, the largest number ever to attend a meeting of the Wilson Ornithological Club. Of these members, two were Founders, 12 were Councillors, 5 were Past Presidents. Several members traveled great distances to attend. Among them were: B. W. Cartwright of Winnipeg, Manitoba; Wendell P. Smith of Wells River, Vermont; Richard L. Weaver and Mrs. L. A. Forsyth of Hanover, New Hampshire; George L. Wallace of Lenox and Miss Ruth D. Turner of Melrose, Massachusetts; E. T. Nelson of New Brunswick, New Jersey; Miss Theodora Nelson of New York City; D. R. Hostetter of Harrisonburg and Mrs. G. T. Wiltshire of Lynchburg, Virginia; Eugene P. Odum of Athens, Georgia.

Twenty-two states and the District of Columbia were represented. Next to Illinois the state with largest attendance was Michigan with fifteen members and seven visitors present.

The list of members in attendance follows:

From **Georgia:** 1—E. P. Odum, Athens. *Visitor,* 1.

From **Illinois:** 39—A. I. Means, Atwood; A. L. Eustice, Barrington; K. E. Bartel, Blue Island; Miss V. R. Johnston, Cerro Gordo; H. G. Anderson, S. C. Kendeigh, C. O. Mohr, H. C. Seibert, R. E. Yeatter, Champaign; Wendell Dahlberg, C. O. Decker, Mrs. Dorothea Ewers, Alfred Lewy, L. B. Nice, Mrs. M. M. Nice, Mrs. W. D. Richardson, W. C. Stanett, R. M. Strong, Chicago; Miss K. A. White, Collinsville; G. B. Happ, Elsah; Harold Ault, Fiatt; H. M. Holland, Galesburg; Rev. G. M. Link, Grafton; W. H. Elder, Havana; C. F. McGraw, Milan; Miss O. R. Spencer, Moline; Ferd Luthy, Peoria; T. E. Musselman, Quincy; C. W. G. Eifrig, River Forest; Frank Bellrose, Jr., V. E. Shelford, Mrs. E. L. Snapp, Mrs. V. Vaniman, H. R. Wanless, and L. E. Yeager, Urbana. *Visitors,* 80.

From **Indiana:** 8—Miss Margaret Umbach, Fort Wayne; Miss M. F. Campbell, Miss M. R. Knox, Miss Dorothy Hobson, Miss C. A. Moore, Indianapolis; Miss Elizabeth Mullin, Muncie; C. G. Fredine, C. M. Kirkpatrick, Lafayette. *Visitor,* 1.

From **Iowa:** 1—Jean Laffoon, Sioux City.

From **Kansas:** 1—Miss Lena Feighner, Kansas City. *Visitor,* 1.

From **Kentucky:** 13—B. L. Monroe, Anchorage; C. P. Grant, Covington; Clayton Gorden, H. C. Rogers, Glasgow; C. C. Counce, Hopkinsville; L. C. Brecher, Miss Amy Deane, Miss R. J. Green, Miss Helen Peil, Miss E. J. Schneider, Miss Mabel Slack, Miss A. A. Wright, J. B. Young, Louisville. *Visitors,* 2.

From **Manitoba:** 1—B. W. Cartwright, Winnipeg.

From **Maryland:** 1—W. J. Howard, Chevy Chase.

From **Massachusetts:** 2—G. J. Wallace, Lenox; Miss R. D. Turner, Melrose.

From **Michigan:** 15—Pierce Brodkorb, J. L. George, H. W. Hann, J. Van Tyne, H. H. Wilcox, Jr., Ann Arbor; E. M. Brigham, Jr., L. H. Walkinshaw, Battle Creek; Mrs. G. A. Kelly, Miss G. V. Sharritt, Miss E. W. Townsend, Detroit; S. M. Pell, Huron Mountain; C. H. Cook, Lakeside; B. W. Baker, Marne; F. N. Hamerstrom, Jr., Pinckney; Mrs. E. D. Keifer, Port Huron. *Visitors,* 7.

From **Minnesota:** 4—W. J. Breckenridge, Gustav Swanson, Minneapolis; O. S. Pettingill, Jr., Miss Peggy Muirhead, Northfield. *Visitor,* 1.

From **Missouri:** 5—G. H. Klinkerfuss, Mrs. G. H. Klinkerfuss, Normandy; Miss N. L. Binnington, Richard Grossenheider, Wayne Short, St. Louis. *Visitors,* 6.

From **New Hampshire:** 2—Miss L. A. Forsyth, Richard Weaver, Hanover.

From **New Jersey:** 1—E. T. Nelson, New Brunswick.

From **New York:** 3—G. M. Sutton, Ithaca, Miss Theodora Nelson, R. T. Peterson, New York City. *Visitor,* 1.

From **North Dakota:** 1—O. A. Stevens, Fargo.

From **Ohio:** 12—K. H. Maslowski, Cincinnati; Miss M. E. Morse, Cleveland; Miss Vera Carrothers, East Cleveland; H. L. Barry, L. E. Hicks, D. L. Leedy, R. H. Mills, Columbus; J. H. Jenkins, Mt. Vernon; T. W. Porter, Oak Harbor; Lynds Jones, Oberlin; Harold Mayfield, Toledo. *Visitors,* 5.

From **Pennsylvania:** 5—M. G. Netting, G. B. Thorp, W. E. C. Todd, A. C. Twomey, Pittsburgh; J. F. Cassel, Reading.

From **Tennessee:** 1—A. F. Ganier, Nashville.

From **Vermont:** 1—W. P. Smith, Wells River.

From **Virginia:** 2—D. R. Hostetter, Harrisonburg; Mrs. G. T. Wiltshire, Lynchburg. *Visitor,* 1.

From **West Virginia:** 3—I. B. Boggs, Maurice Brooks, Morgantown; Mrs. Elizabeth Etz, Wheeling.

From **Washington, D.C.:** 3—Frank C. Craighead, R. C. McClanahan, J. W. Aldrich.

From **Wisconsin:** 9—Mrs. H. L. Playman, Mrs. W. E. Rogers, Appleton; W. E. Scott, Madison; Murl Deusing, Carl Kinzel, W. J. Mueller, Peter Steib, Milwaukee; R. H. Gensch, Rhinelander; Miss E. M. Heinke, Stoughton. *Visitor,* 1.

Summary of Attendance: Total registration, 241 (members, 134, visitors, 107); Total from Urbana-Champaign, 38 (members, 11, visitors, 27); Total from Illinois, 119 (members, 39, visitors, 80). Total outside of Illinois, 122 (members, 95, visitors, 27). Maximum number at each session: Friday morning, 160; Saturday morning, 175; Saturday afternoon, 200; Symposium, 150. Approximate number at motion picture show Friday evening, 460. Number at Annual Dinner, 174. Number of persons in group photograph, 154.

REPORT OF THE MEMBERSHIP COMMITTEE

The present Chairman assumed office in January 1941. The committee has been enlarged since then to seventy members so as to have active representatives in most of the states and in the larger metropolitan areas or centers of ornithological activity.

The committeemen have been exceptionally active and have recommended a great many ornithologists and naturalists for membership.

Some members who had been delinquent in dues for two years were induced to rejoin the Club.

The descriptive folder for the Club and the *Wilson Bulletin* have been of great value in interesting people in the organization and in obtaining new members.

As the result of the cooperative efforts of the whole committee 284 new members have been added to the Club during 1941. They are divided as follows: one Sustaining, 35 Active, and 248 Associate Members.

November 22, 1941.

Respectfully submitted,
RICHARD L. WEAVER, *Chairman.*

The Chairman of the Membership Committee announces the following additions to the Committee:

Illinois	Mrs. Virginia Eifert	Ohio	Karl Maslowski
Indiana	C. Gordon Fredine	Oklahoma	Leonard Uttal
Massachusetts	Miss Ruth D. Turner	Washington, D.C.	John Aldrich
Missouri	Wayne Short		James O. Stevenson
New York	Roger Tory Peterson	West Virginia	I. B. Boggs
North Dakota	Stanley Saugstad	Canada	B. W. Cartwright

ADDITIONAL NEW MEMBERS

The following applications for membership in the Wilson Ornithological Club were received between November 15 and December 31, 1941. They could not be included in the annual membership roll published in *The Wilson Bulletin* for December, 1941, and are therefore included in this issue. All will, of course, be included in the next complete membership roll published.

Sustaining

Alfred Leroy Eustice, Bright Land Farm, Barrington, Ill.

Active

James Henry Bruns, 724 Whitney Bldg, New Orleans, La.
Lieut.-Col. Robert Patrick Carroll, Honeysuckle Hill, Lexington, Va.
Russell Benjamin Harris, 2100 Madison Ave., Apt. 2, Toledo, Ohio.
Harold Holmes Harrison, The Valley Daily News, Tarentum, Pa.
Alexander Henderson, 89 Woodland Road, Chestnut Hill, Mass.
Francis Lee Jackson, 541 Hammond St., Chestnut Hill, Mass.
Dr. G. H. Klinkerfuss, 340 Bermuda Ave., Normandy, Mo.
Mrs. G. H. Klinkerfuss, 340 Bermuda Ave., Normandy, Mo.
Dr. Earl Newlon McCue, P. O. Box 104, Morgantown, W. Va.
Walter Rosene, Jr., 1210 Jupiter, Gadsden, Ala.
Miss Maxine Thacker, Branchland, W. Va.
Mrs. Joseph E. Vollmar, 6138 Simpson Ave., St. Louis, Mo.
Henry Taylor Wiggin, 131 Tappan St., Brookline, Mass.

Associates

William Bryan Barnes, Room 10, State House Annex, Indianapolis, Ind.
Ernest Nutter Beatty, Jr., 2206 Auburn Ave., Cincinnati, Ohio
George Charles Becker, Port Edwards, Wis.
Miss Elizabeth Margaret Boyd, Mount Holyoke College, South Hadley, Mass.
Miss Arminta Alice Brandenburg, State Hospital, Toledo, Ohio.
Joseph Brauner, 151 Savoy St., Bridgeport, Conn.
Miss Katherine Marie Brindley, 1920 Mt. Vernon Ave., Toledo, Ohio
Eugene Spencer Castle, 80 S. State St., Elgin, Ill.
Roland C. Clement, 804 Walnut St., Fall River, Mass.
John A. Collins, Jr., 20 Quincy St., Lawrence, Mass.
James Earl Comfort, 551 W. Kirkham Ave., Webster Groves, Mo.
James F. Comfort, 27 N. Iola Dr., Webster Groves, Mo.
Frank C. Craighead, 5301 41st St., N.W., Washington, D. C.
Edmund Rust Cross, 1751 University Ave., San Diego, Calif.
Miss Amy Deane, 2313 Hale, Louisville, Ky.
George Andrew Dorsey, Vinings, Ga.
Harry E. Duer, 1651 E. 93rd St., Cleveland, Ohio.
Mrs. Elaine Edmonds, Keene Valley, N. Y.
Mrs. H. D. Eifert, Illinois State Museum, Springfield, Ill.
Donald S. Farner, Biology Building, Madison, Wis.
James Bush Fleugel, 1104 American National Bank Bldg., Kalamazoo, Mich.
Harold Nelson Gibbs, A-71 Sowams Rd., Barrington, R. I.
Herchel T. Gier, Ohio University, Athens, Ohio.
Clayton Goodwin, Glasgow, Ky.
Miss Cora Janet Hackett, 3934 Avery Ave., Detroit, Mich.
L. George Hoth, 4 Cross Place, Glen Ridge, N. J.
John D. Jameson, Sugar Hill, N. H.
Charles M. Kirkpatrick, Dept. of Forestry, Purdue University, Lafayette, Ind.
Frank J. Kozacka, 81 Cedar St., Amesbury, Mass.

Duncan McArthur Marshall, 12801 Gratiot Ave., Detroit, Mich.
Miss Esther Mason, Montgomery Ave., Louisville, Ky.
Robert H. Mitchell, 19 S. Liberty St., New Concord, Ohio.
Miss Laura Brooks Moore, French Creek, W. Va.
Mrs. Louise Davol Nortin, 360 Prospect St., Fall River, Mass.
Miss Helen Peil, 2064 Sherwood Ave., Louisville, Ky.
Robert Allan Pierce, Nashua, Iowa.
Mrs. H. L. Playman, 217 N. Union St., Appleton, Wis.
Miss Marian Frances Pough, 4 Lenox Place, St. Louis, Mo.
Samuel Dowse Robbins, Jr., 422 N. Murray St., Madison, Wis.
H. C. Rogers, Glasgow, Ky.
Mrs. Otto Ruccker, Seapowet Farm, Tiverton, R. I.
J. Max Shepherst, 504 River Rd., Maumee, Ohio.
Albert E. Shirling, 3849 E. 62, Kansas City, Mo.
Luther Ely Smith, 1554 Telephone Bldg., 1010 Pine St., St. Louis, Mo.
Harry Herbert Stone, Jr., P. O. Box 101, Sturbridge, Mass.
S. Warren Sturgis, 66 Marlboro St., Boston Mass.
Ralph W. Velich, Nebraska State Museum, University of Nebraska, Lincoln, Nebr.
Alfred Wallner, 111 Roby Rd., Madison, Wis.
Louis M. Weber, 2713 Dadier St., St. Louis, Mo.
Miss Audrey Wright, 1312 Hepburn, Louisville, Ky.
Arnold Zempel, 7823 Stanford Ave., University City, Mo.

REPORT OF THE WILDLIFE CONSERVATION COMMITTEE

The membership of this committee has been changed somewhat, to give a better geographic spread. The present members are:

Rudolf Bennitt
C. A. Dambach
Paul L. Errington
Wallace Grange
Ludlow Griscom
F. N. Hamerstrom, Jr.
Arthur S. Hawkins
William J. Howard
Harrison F. Lewis
Seth H. Low
Margaret M. Nice
Miles D. Pirnie
Richard H. Pough
Herbert L. Stoddard
Gustav Swanson
Milton B. Trautman
Leonard W. Wing

The work of the Committee has appeared currently in the *Bulletin* and needs no review here.

I should like to emphasize one point. The Conservation Committee can do a better job if every member of the Club will take part. From time to time, the Committee will call on individuals for information on specific problems; however, I urge every member of the Club to send me suggestions without waiting to be asked. If you have an article for the Conservation Section of the *Bulletin*, or if you have a lead that the Committee should follow up, send it in; if you have criticisms of the work of the Committee, let me know. The Committee will appreciate your help in keeping posted.

November 18, 1941.

F. N. Hamerstrom, Jr., *Chairman*.

REPORT OF THE COMMITTEE ON AFFILIATED SOCIETIES

With profound regret, your Committee on Affiliated Organizations has to record the death of one of its members, Dr. Myron H. Swenk, of the University of Nebraska, within the past year.

During the year since the Minneapolis meeting the movement toward affiliation of ornithological societies in the United States and Canada has gained momentum.

The Wilson Club itself, and the Cooper Ornithological Club have consummated affiliation with the American Ornithologists' Union. At the Denver meeting of the A.O.U. this past September our club was officially represented on the Council by Dr. George M. Sutton.

Shortly after last year's meeting Mr. Ganier prepared a letter dealing with affiliation matters and it was sent to the officers of a number of state ornithological societies.

We are happy to report that during the year three strong and active organizations, the Inland Bird Banding Association, the Virginia Ornithological Society, and the Georgia Ornithological Society, have, by practically unanimous vote, signified their intention and desire to affiliate with the Wilson Club. Formal consummation of this affiliation will be effected during the present meeting.

Dr. Kendeigh has drawn up the articles of affiliation which will be used.

The Executive Committee of the Wisconsin Society of Ornithology has expressed interest in possible affiliation, and has decided to present the matter for a vote to the entire society at a meeting next April. Other state organizations have shown an interest in affiliation, and it is hoped that our association may grow in numbers and mutual usefulness.

Respectfully submitted,
MAURICE BROOKS, *Chairman*

November 20, 1941.

REPORT OF THE LIBRARIAN FOR THE YEAR ENDING NOVEMBER, 1941

I have the honor to present herewith the eleventh annual report of the Librarian of the Wilson Ornithological Club.

Many valuable gifts have been presented to the library this past year. There were 247 unbound periodicals and reprints received from thirty members of the Club. In addition there were 23 bound volumes from five members. A detailed list of these gifts will be found in the four numbers of the *Wilson Bulletin* for 1941.

We are receiving 59 journals, some in exchange for the *Wilson Bulletin* and others by gift. Because of the unsettled condition of the world we have not received some numbers but enough keep slipping through to encourage us in the belief that we will eventually have a complete file of all the journals.

All 1941 *Bulletins* printed to date have been received and housed in a suitable place. There has been a brisk sale of the *Bulletins* this past year which may make it necessary to provide more space for the office supply that is used for current distribution.

May the Librarian call attention to a new edition of the Union List of Serials in Libraries of the United States and Canada, edited by Winifred Gregory, which will be available early in 1942. Members can check this list to find what we have of any one title. If you find you have duplicates of anything we lack, the Librarian will be glad to receive them. The Union List will be found in most libraries over the United States and Canada.

Respectfully submitted,
F. RIDLEN HARRELL, *Librarian.*

November 19, 1941.

REPORT OF THE SECRETARY FOR 1941 [1]

Membership in the Wilson Ornithological Club now totals 1,181 and is classified as follows: Honorary, 4; Life, 10; Sustaining, 38; Active, 374; Associate, 755.

Altogether 178 members were lost during the year: 173 were delinquent in dues or resigned; 5 were taken by death. The total number of new members obtained this year will be announced by the Chairman of the Membership Committee,

[1] Revised through December 31, 1941.

Dr. Richard L. Weaver. For his tireless efforts in securing this remarkably high figure, he alone deserves this privilege. The Secretary will only say that we now show a net gain of 141 members over the total for 1940 *and a net gain of 137 over the all-time-high of 1939!* After several years of trial and error, it appears that this organization has finally hit upon a surefire method of membership solicitation.

Ohio continues its lead of the past several years with 118 members. Michigan, New York, Illinois, Minnesota, and Pennsylvania follow with 98, 83, 80, 74, and 61, respectively. The state showing the greatest rise in members is Wisconsin—its membership is nearly double that of last year.

The total distribution of members by states, provinces, and foreign countries is given below. The figures in parentheses indicate the number of members new to the organization in 1941.

UNITED STATES					
Alabama	5	(2)	New York	83	(17)
Arizona	13	(7)	Ohio	118	(36)
Arkansas	5	(1)	Oklahoma	11	
California	50	(4)	Oregon	6	
North Carolina	7		Pennsylvania	61	(12)
South Carolina	5		Rhode Island	5	(3)
Colorado	12	(2)	Tennessee	19	(1)
Connecticut	8	(1)	Texas	22	(1)
North Dakota	10	(1)	Utah	13	(8)
South Dakota	4	(1)	Vermont	5	(3)
Delaware	1		Virginia	16	(5)
Florida	14	(2)	West Virginia	18	(8)
Georgia	18	(7)	Washington	7	(2)
Idaho	3	(1)	Washington, D. C.	26	(2)
Illinois	80	(13)	Wisconsin	56	(25)
Indiana	29	(9)	Wyoming	9	(1)
Iowa	27	(4)	Alaska	2	
Kansas	5		Virgin Islands	1	
Kentucky	25	(8)	CANADA		
Louisiana	10	(4)	Alberta	1	
Maine	6		British Columbia	2	
Maryland	14	(1)	Manitoba	3	
Massachusetts	48	(21)	Ontario	22	(4)
Michigan	98	(24)	Quebec	2	
Minnesota	74	(9)	Saskatchewan	2	
Mississippi	6	(1)	FOREIGN COUNTRIES		
Missouri	35	(15)	Cuba	1	
Montana	6	(1)	Great Britain	2	
Nebraska	11	(3)	Northern Rhodesia	1	
New Hampshire	11	(6)	Switzerland	1	
New Jersey	18	(7)	Venezuela	2	
New Mexico	6	(1)			

From February through June the Secretary was away on an expedition to Mexico. A large part of his duties were assumed by the Treasurer. The remainder were undertaken by the Editor and the Chairman of the Membership Committee. To these gentlemen he is deeply indebted.

At the conclusion of this meeting the Secretary will have completed his fifth and last year of office. He will leave the office grateful that he received the very finest cooperation from members the country over and with the everlasting feeling that he has enjoyed and will continue to enjoy the many acquaintances which the office has brought him. May his successor be as fortunate!

Respectfully submitted,

November 21, 1941. OLIN SEWALL PETTINGILL, JR., *Secretary*

REPORT OF THE TREASURER FOR 1940

Balance as shown by last report, Nov. 20, 1940	$ 114.57	
Total receipts from dues, subscriptions, and contributions Nov. 20, 1940, to Nov. 17, 1941	2,450.22	
TOTAL RECEIPTS		$2,564.79
Disbursements:		
Subscription refunds	$ 9.36	
Secretary's expense	148.96	
Annual meeting expense	160.29	
Editor's expense: postage, mailing *Bulletin*	60.67	
Membership committee expense: postage, printing	180.59	
Treasurer's expense: postage, printing, clerical aid	110.68	
Bank charges: exchange charges, returned checks	42.35	
Bulletin expense: printing, engraving	1,809.86	
TOTAL DISBURSEMENTS		$2,522.75
Balance on hand in St. Anthony Park State Bank, St. Paul, Minn., on November 17, 1941		$ 42.04

Respectfully submitted,
GUSTAV SWANSON, *Treasurer*

November 22, 1941.

Approved by Auditing Committee
R. M. Strong
Burt L. Monroe

WILSON ORNITHOLOGICAL CLUB LIBRARY

The following gifts have been received recently:

William H. Behle—4 reprints
Maurice Brooks—1 reprint
Adrian C. Fox—1 reprint
F. N. Hamerstrom, Jr.—44 pamphlets and reprints
Mrs. Earle Jackson—1 bulletin
E. A. McIlhenny—2 reprints
Margaret M. Nice—1 reprint
William H. Phelps—1 pamphlet
Edward C. Raney—2 reprints
A. W. Schorger—70 pamphlets
A. M. Woodbury—3 reprints
C. Brooke Worth—14 reprints

There is a demand for information on current wildlife research in the United States. The U. S. Fish and Wildlife Service will therefore endeavor to assemble and release this information annually in condensed form. They suggest that you send to them in Washington before June 1 the titles of your research problems together with the year of probable completion and your name and address.

THE WILSON BULLETIN PUBLICATION DATES

The actual dates of publication of the four numbers in 1941 were: March 28, June 12, September 24, December 20.

TO OUR CONTRIBUTORS

Our members are asked to submit articles for publication in the *Bulletin*. Manuscripts will be accepted with the understanding that they have not been published or accepted for publication elsewhere.

MANUSCRIPT. Manuscripts should be typed on paper of good quality and of letter size (8½ x 11). Write on one side only and use double spacing. The title should be brief and carefully constructed so as to indicate clearly the subject. Ordinarily the scientific names of the birds treated should be given and should appear early in the article. Most articles should have a brief summary at the end.

ILLUSTRATIONS. Photographic prints, to reproduce well as half-tones, should have good contrast and detail. Please send prints unmounted, and attach to each print a brief but adequate legend. Do not write heavily on the backs of photographs.

BIBLIOGRAPHY. Literature cited should ordinarily be listed at the end of articles. These citations should be complete and references to them in the text should be made by the year of the citation and the exact pages referred to.

PROOF. Galley proof will be submitted to authors and must be returned promptly. Expensive alterations in copy after the type has been set must be charged to the author.

REPRINTS. The Club is unable to furnish free reprints to authors. Arrangements will be made, however, for such reprints to be made at cost. A scale of costs, based on the number of pages, is given below. Orders for reprints should accompany the returned galley proof. Charge will be made for a minimum of 100 reprints.

REPRINT SCHEDULE OF THE WILSON BULLETIN

	1 page	2 pp.	4 pp.	8 pp.	12 pp.	16 pp.	Each Additional 4 pp.
100 copies	$1.95	$2.10	$2.40	$4.15	$5.90	$7.00	85c
Each Additional 100 copies	70c	85c	1.40	2.20	2.90	3.50	55c

Covers: $3.85 for first 100 copies; $1.40 for additional 100 copies.

ANNUAL MEETINGS OF THE WILSON ORNITHOLOGICAL CLUB

		President
1914—Chicago	February 5	T. C. Stephens
1914—Chicago	December 29-30	T. C. Stephens
1915—Columbus	December 28-29	T. C. Stephens
1916—Chicago	December 27-28	T. C. Stephens
1918—Pittsburgh	January 1-2	W. F. Henninger
1919—St. Louis	December 29-30	M. H. Swenk
1920—Chicago	December 27-28	R. M. Strong
1921—Chicago	December 26-27	R. M. Strong
1922—Chicago	October 24	T. L. Hankinson
1923—Cincinnati	Dec. 31-Jan. 1, 1924	T. L. Hankinson
1924—Nashville	November 28-30	A. F. Ganier
1925—Kansas City	December 28-29	A. F. Ganier
1926—Chicago	November 26-27	A. F. Ganier
1927—Nashville	Dec. 30-Jan. 1, 1928	Lynds Jones
1928—Ann Arbor	Nov. 30-Dec. 1	Lynds Jones
1929—Des Moines	December 27-28	Lynds Jones
1930—Cleveland	December 29-30	J. W. Stack
1931—New Orleans	December 28-29	J. W. Stack
1932—Columbus	November 25-26	J. M. Shaver
1934—Pittsburgh	December 28-29	J. M. Shaver
1935—St. Louis	December 30-31	J. Van Tyne
1936—Chicago	November 27-28	J. Van Tyne
1937—Indianapolis	December 27-28	J. Van Tyne
1938—Ann Arbor	November 25-26	M. M. Nice
1939—Louisville	November 24-25	M. M. Nice
1940—Minneapolis	November 22-23	L. E. Hicks
1941—Urbana	November 20-23	L. E. Hicks